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THE

NATURAL HISTORY REVIEW.

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THE

NATURAL HISTORY REVIEW:

A QUARTERLY JOURNAL

OF

ZOOLOGY, BOTANY, GEOLOGY, AND PALÆONTOLOGY.

CONDUCTED BY

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AND OTHERS.

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REVIEWS

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OBITUARY.

Died on the 30th of March, 1857, at his house in Granby-row, Dublin, Robert Ball, LL.D., one of the Editors of this Journal. Doctor Ball was Secretary to the Queen's University, and Examiner to the Board of Commissioners of Civil Services for Ireland. The relation in which he stood to the studies of Zoology and the kindred sciences is but imperfectly suggested by his titles in connexion with the principal public scientific bodies in Dublin, where he resided. He was Treasurer of the Royal Irish Academy of Science; Secretary to the Royal Zoological Society; Director of the University Museum, and President of the University Zoological and Botanical Association, in Trinity College; Vice-President of the Geological Society; Member of Council of the Royal Dublin Society, the Statistical Society, etc. And these were not honours sought by him for the ornament of a name, but offices imposed upon him by the public appreciation of his superior fitness, and duties which he fulfilled with the energy, discretion, unselfish kindliness and strong sense of honour, which were so eminently characteristic of him through life, and in all its relations. The Royal Irish Academy, with other scientific societies, and not those only with which he was directly connected, have testified to the blank he has left, by adjourning, without entering on any scientific proceedings, at their meetings next after his decease. Doctor Ball was President Elect of the Section of Zoology and Botany of the British Association for the Advancement of Science, in their meeting of 1857, when he was taken away in the vigour of life, and the full career of social usefulness. Of the colleague and the friend, our own more especial loss, we cannot trust ourselves to speak now particularly.

Eds. N. H. R.

THE

NATURAL HISTORY REVIEW.

Reviews.

A Synopsis of the British Diatomaceæ, with Remarks on the Structure, Functions, and Distribution; and Instructions for Collecting and Preserving Specimens. By William Smith, F.L.S., Professor of Natural History, Queen's College, Cork. Vol. II. 21s.

It is a pleasant thing to find one's anticipations of good realised. Some months ago, when noticing the first volume of the "British Diatomaceæ," and finding it a book deserving of our best wishes and calling from us no ordinary meed of praise, we deemed justified in venturing a prophecy, from the earnest then afforded, that the second volume would in no respect fall behind its forerunner. We have prophesied well and truly, for our anticipations have not only been fully realised, but have even been exceeded; and we rejoice in being able now to call the attention of our readers to the second and concluding volume of one of the most useful works which has of late years been placed in the hands of the investigator of the microscopic forms of organised existence.

The author has reserved for the present volume some very important topics connected with the general history of the Diatomaceæ—their highly curious reproductive phenomena, their exact nature, and the status they hold in the organic creation; the characters to be relied on in the determination of genera and species, and the laws by which they are governed in their Geographical distribution: all of which are well discussed in an introduction to the systematic portion of the volume.

On the subject of the reproduction of the Diatomaceæ especially, Mr. Smith has rendered us acquainted with some new facts of much physiological importance, and tending to throw considerable light on the import of the curious phenomenon of "Conjugation." It is now about eight years since Mr. Thwaites announced the very significant fact that he had observed

in a species of Diatomaceæ a process entirely similar to the "conjugation" with which botanists were already familiar, as occurring in several of the green freshwater algæ. In *Enotia turgida*, in which he first witnessed this phenomenon, two of the microscopic unicellular plants, of which this species consists, were seen to approach one another, and pour out from within their siliceous skins, which opened for the purpose, the whole of the soft, semi-fluid contents of their bodies, mingling the one with the other, and leaving behind nothing but the empty shells. The mingled contents soon shaped themselves into two cylindrical masses, or "sporangia," which gradually became more and more similar to the parents, encasing themselves, like them, in a flinty shell, and ultimately differing from them chiefly in their very much larger size.

We well remember hearing Mr. Thwaites's paper read for the first time, at one of the meetings of the British Association; and the interest which the botanists then present took in so important an announcement will not easily be forgotten; for it was deemed that the point was at last discovered which decided the true relations of these enigmatical organisms; that their supposed animality was a simple delusion; and that the territory of the Diatom must, without further demur, be handed over to the dominion of Flora.

With the exception of Mr. Thwaites's subsequent statement of some additional instances of the process just described, and his discovery of the interesting fact that in certain species the "sporangium" repeats itself by division, our knowledge of the conjugation of the Diatomaceæ had rested pretty much as he left it. It was still evident, however, that something yet remained to be determined, and the true import of the sporangial frustule, the immediate result of the curious conjugation, continued unexplained.

When a subject like the present falls into the hands of a patient and laborious observer, we may safely expect some results; and it cannot, therefore, be matter of surprise that Mr. Smith is enabled, in the volume before us, to present us with numerous additional instances of conjugation, as well as confirmations of the very accurate accounts of Thwaites, making in all no less than twenty-seven distinct cases, which have all come under his own observation.

But a still more important step towards the determination of the true significance of Conjugation, than that suggested by the mere accumulation of instances, has been made by Mr. Smith. The ultimate destination of the "sporangial frustule," the immediate product of the conjugative act, had

hitherto remained involved in great obscurity, the known facts admitting of nothing but loose surmises of little scientific value. Some phenomena, however, have come under the observation of Mr. Smith which seem to go far towards a satisfactory determination of this important point. He has rendered it, indeed, almost certain that the contents of the sporangial frustule ultimately resolve themselves into a brood of young Diatoms, exactly repeating the form of the original conjugating individuals—an observation which we do not hesitate to say is one of the most important which has of late years been made in the physiology of plants.

The difficult subject of the determination of species in the Diatomaceæ, and the selection of the characters on which the systematist must rely in the construction of his natural groups, is well discussed; and it is shown that mere difference of size, and even slight difference of outline, cannot be depended on as indicating a specific separation of two individuals. The character of the Striation and the arrangement of the Endochrome are the points on which our author chiefly relies; and in this we entirely agree with him. We cannot, however, quite make out in what rank he would place *habitat*, when he speaks of it as assisting in the determination of species. If he means that it should be considered as a character forming a constituent part in a diagnosis, we cannot assent; but it is probable, after all, that what he really intends to convey is simply that the fact of two given specimens being found, one in the sea, and the other in fresh water, will afford *a priori* reasons for suspecting a difference of species, and will lead the observer to seek for valid specific characters in the striation and the arrangement of the endochrome. If this be his meaning, we agree with him, and believe his suggestion to be one of much practical value.

The very wide geographical distribution of the species of Diatomaceæ is a curious fact in their history. We find them, indeed, scarcely influenced by those external agencies which set such well-marked boundaries to the areas occupied by organic beings generally. The following account of their distribution will give the reader some idea of this feature in their economy:—

"Of fresh-water species frequent in the British Islands, the following seem almost cosmopolitan, viz.: *Synedra radians*, *Pinnularia viridis*, *Pinnularia borealis*, and *Cocconema lanceolatum*. Gatherings from many localities in Europe, from Smyrna and Ceylon, from the Sandwich Islands, New Zealand, and New York, from the loftiest accessible points of the Himalaya in Asia, and the Andes in America, have supplied specimens of these forms.

"*Navicula serians* abounds in all our mountain bogs, and is equally common in the marshes of Lapland and America.

"*Epithemia gibba* is an inhabitant of the Geysers of Iceland and the lakes of Switzerland.

"The South Sea Islands supply *Stauroneis acuta*, and Ceylon *Synedra ulna*;

while *Stauroneis phœnicenteron* is equally abundant in Britain, Sicily, and Nova Scotia.

"These notes of localities will give some idea of the wide distribution of our fluviatile Diatomaceæ; more numerous gatherings would, no doubt, greatly extend the list, and the following circumstance will show how generally our commoner British forms are diffused throughout European localities that have been carefully examined. During a tour in Languedoc and the Auvergne, in the spring of 1854, I made upwards of forty gatherings from the rivers, streams, and lakes of the district I traversed; in these I detected one hundred and thirty species, described in the present work, and but one form not yet determined as indigenous to Britain. If this be the case with a district, much of whose Phanerogamous flora is so different from our own, it bears out the view I have taken, that these organisms enjoy a range of distribution far more general than the higher orders of plant life.

"Nor is the distribution of marine species less notable for its extent and uniformity. *Coscinodiscus eccentricus* and *Coscinodiscus radiatus* range from the shores of Britain to those of S. Africa. *Grammatophora marina* and *Grammatophora macilenta* are found in almost every marine gathering from the Arctic Ocean to the Mauritius. *Stauroneis pulchella*, *Cocconeis scutellum*, and *Biddulphia pulchella* are equally abundant on the European, the American, and the African coasts; while *Rhabdonema adriaticum* belies its name by its occurrence in the Indian, Atlantic, and Pacific oceans. During the researches already mentioned in the South of France, I made several prolific gatherings on the shores of the Gulf of Lyons; but of thirty-three forms occurring in these, *Hyalosira delicatula* Kuetz. was the only one not familiar to me as a British species."

In our notice of the first volume of "The British Diatomaceæ," we ventured to predict the rapid discovery of new forms, which would result from having so valuable an aid placed in the hands of the investigator. Our prophecy has turned out true. In proof of this, we have only to refer to the appendix of the present volume, where the reader will find no less than seventy-two species described, belonging to genera contained in the first volume, and all of which have been discovered by various observers since that volume was published.

We cannot conclude the present notice without a word regarding the thirty-seven plates with which it is illustrated. These plates, like those of the former volume, are engraved by Mr. T. West. They are even superior, as works of art, to the plates contained in that volume, and deserve our highest praise as specimens of Natural History iconography. G. J. A.

Elements of Entomology; an Outline of the Natural History and Classification of British Insects. By William S. Dallas, F.L.S. London: Van Voorst.

A work bearing the above title is now in course of publication. It is to be completed in fifteen monthly parts, three of which have already appeared. When we add that they are brought out at the very low price

of sixpence each, it is obvious that the publisher must anticipate a large sale; for nothing else would enable him to meet the expense of publication, and to realise a profit. This fact is worthy of note; for, as publishers must in their undertakings have reference to the public wants and wishes, we may infer that Mr. Van Voorst considers that he can now appeal to a circle of readers very different in extent from that to which such a publication could, even a few years ago, have been addressed. We have, therefore, in this, an evidence of the increasing public desire for zoological knowledge, especially in one of its most fascinating departments.

We prefer waiting until the work is complete, before expressing any critical opinion on its merits. At present, we would do little more than announce its existence, and convey to our readers, so far as these numbers enable us, an idea of the course pursued by the author. He has not given any "preface" or "introduction;" so that we have no explanation presented to us of the plan he intends to adopt, or the precise views which it is his intention to bring forward and elucidate. The subjects, successively taken up in the several chapters, are the only landmarks which indicate the general direction of the road along which Mr. Dallas proposes to guide the young Entomologist.

"What is an Insect?" is the question asked and answered in Chapter I. The "Structure of Insects in general" occupies Chapter II. This is followed by "Sexes and Transformations"—"Classification and Nomenclature." Chapter V. is devoted to the Coleoptera; and we may presume that the other orders will follow in regular sequence. The style is simple and perspicuous, and the young student who reads these "Elements of Entomology" will never feel a doubt as to the author's meaning. It is clear and intelligible throughout.

But it would be doing injustice to Mr. Dallas if we did not add, that the didactic style is occasionally forsaken, for one more congenial to youth, and not without attraction even to those of advanced or declining years. As an instance, we would refer to his description, at page 65, of a Londoner's spring ramble, and its concomitants, including the Brimstone butterfly *(Gonypteryx Rhamni)* and the Tiger beetle *(Cicindela campestris)*. To join in such a walk, we would throw down our pen, lay aside our spectacles, and forsake our library and easy chair; for we reside in a locality where the Tiger beetle is unknown, and where we have lived for more than twenty years without our eyes having been "gladdened," during all that time, with the sight of a Brimstone butterfly on the wing. R. P.

Ornithological Synonyms. By the late Hugh E. Strickland, M.A., F.R.S., &c. Edited by Mrs. H. E. Strickland and Sir W. Jardine, Bart. 8vo. London: Van Voorst. 1856. 12s. 6d.

It is impossible for any person who has not entered well into the study of practical Ornithology duly to appreciate the difficulties attending it; owing, mainly, to the reckless way in which Synonyms have been multiplied. Sir W. Jardine, in the preface to the work of his much-lamented son-in-law, Mr. Strickland, while he alludes to the many causes which have occasioned the multiplication referred to, does not, we think, bear sufficiently heavily on the class of persons who seek to be enrolled in the list of naturalists on the score of altering established nomenclature; for it is not possible to imagine, in some cases, any other motive. Mr. Strickland in some of his published papers, viz., in Mag. Nat. Hist., Vol. VIII., p. 636, and Vol. I., n.s., p. 127, commented warmly and strongly on this practice. For its prevention, it was proposed, 1st. That no name should be acknowledged in Natural Science, until it had been submitted to, and approved of by, a Scientific Committee to be elected from the Savans of Europe. 2nd. Any name thus sanctioned not to be altered without the consent of the aforesaid body. Just as our law requires that no man shall change his own family name, without obtaining an approval, under the sign manual of the Queen, and recording the same in the office of arms; and this sanction, be it observed, is only given on fair reasons being shown that the change is proper and desirable; in the absence of such reasons it is withheld. We fear, however, that the organization of such a committee is impracticable. Another scheme proposed is to suppress all notice of the introducers of useless names; but this will not do, for several reasons; principally because it would prevent the correction of errors. We think a plan (a Caustic one) may be adopted which would tend to correct the abuse in question, viz., that when authors, who are well assured of what they are about, find it necessary to quote those of whom we complain, they should, after each improper or needless Synonym insert the word "Silly," or "Ignorant," or such other qualifying addition as the case may seem to require.

But we have wandered from our immediate subject. We had the happiness of well knowing the estimable author, lost to us in his prime, (he was dashed to pieces by a passing train whilst absorbed in the contemplation of a geological section in a railway cutting;) we have been engaged with him in devising rules for the improvement of nomenclature; and though we cannot take much credit for work done individually in this matter, we

know how earnestly and usefully he laboured. We have also been with him when employed in collecting materials for the work now before us, and have admired the industry, acumen, and learning which he displayed; and while we rejoiced that so necessary a work was in such competent hands, we felt somewhat grieved that the impertinences to which we have referred should occupy so much of the attention of one who was well qualified to reform the whole system of Ornithology. We are aware that he had not trammelled himself with artificial systems, but that, taking birds as he found them, he sought in their obvious affinities the right key to their classification. Would that he had lived to work this out.

We have just had the authority of one of our eminent ornithologists for saying that no work, such as that now before us, has been so well done. The unravelling of Synonymy is a labour of science which requires much learning, exemplary patience, and great impartiality; while to ordinary persons it shows no considerable results, it is most valuable to scientific men, especially in economising of time, and enabling those who have but little leisure to do good service. We cannot, therefore, be too grateful to persons whose erudition and self-devotion are applied to the accomplishment of such works as that of Mr. Strickland. Notwithstanding what we have said, it is obvious that it is not a book from which extracts can be here given; but some notion of the labour attending its compilation may be attained when, without counting the time spent in museums, collating collections, correspondence, &c., it is known that he has referred to about seven hundred works of authors in various languages. One use of the work is its serving as a means of reference to the several authors quoted. It must not, however, be depended on as an Universal index, as we find, doubtless for some good reason, that no reference is made to the authors who have noticed some of the recent additions to our list of Accipitres, though these authors are quoted in ordinary cases. On the whole, we strongly recommend the book, and we think no ornithologist should be without it. R. B.

General Outline of the Organization of the Animal Kingdom, and Manual of Comparative Anatomy. By Thomas Rymer Jones, F.R.S., Professor of Comparative Anatomy in King's College, London. Second Edition. 8vo. London: Van Voorst. 1855. £1 11s. 6d.

It is now about fifteen years since the first edition of Professor Rymer Jones's "General Outline of the Animal Kingdom" was placed in the hands

of the naturalist. It was by far the best book on the general structure of animals then available to the English reader; and its lucid and graphic descriptions, and the beauty of its intercalated wood-cuts—a mode of illustration far from common at that time—conferred on it no ordinary popularity, and rendered it an universal favourite with both professor and student.

Years, however, passed on, and zoologists continued to ply their work with energy and zeal. Hosts of active investigators were busy, both at home and abroad, with the scalpel and the microscope; the dredge was drawing from the deep new Invertebrate forms, to supply the missing links in the great chain-net of organization, and fresh light was being shed on the nature, relations, and significance of Vertebrate structure. It can no longer, therefore, be matter of surprise that the first edition of the work before us should have been passed in the great race of discovery, and that other books fresh with the results of the physiological investigations of the day should have been taking its place on the shelves of our libraries, and in the hands of our students.

A new edition was, therefore, loudly called for, and has accordingly appeared; and it only remains now to be seen whether it has overtaken the progress of science, and whether the "General Outline of the Animal Kingdom" is once more, after its long interval of rest, a true exponent of the actual state of Anatomical Zoology.

We believe we may safely affirm that the present volume is a valuable addition to the library of the zoologist, and one with which every student of Comparative anatomy will do well to make himself acquainted; and yet we do not think that in all respects it has come up to the actual state of science.

We can refer to many of its chapters as excellent, and as containing succinct and admirably given statements of recent investigations made in various departments of physiological research—statements conveyed, too, in that peculiar style of graphic description, in which we think the author stands almost without a rival.

Among the subjects in which the present volume has greatly the advantage over its predecessor, we may instance the introduction of much new matter into the chapter on the Protozoa; of many of the results of Steenstrup's and Van Beneden's researches into that on the Entozoa; the enlargement of the chapter on the Echinodermata, by the addition of some of Mueller's important discoveries in the development of these animals; of that on the Annelida, by the discoveries of Milne-Edwards and of Dr.

Williams; and the incorporation of the Morphological views of Owen with the chapter on the Vertebrata.

With all these improvements, however, we still believe that the book has fallen short of what it might be. Why, for instance, do we hear nothing of the researches of Stein on the Infusoria, and the remarkable "Encysting process" and "Acineta forms," undergone by these animals? Why are we told nothing of the *Hectocotylus* of the Cephalopods, whose history constitutes one of the most remarkable features in the present phase of zoological science? Why are the Bryozoa left with their old pseudo-relatives, the Radiata? Why are the Suctorial Crustacea divorced from their true relations, and placed in the same connection? Other instances of a like kind might be mentioned in which our author has not fully represented the present state of zoology; and yet, always making allowance for these deficiencies, we have no hesitation in recommending the second edition of the "General Outline of the Animal Kingdom" as a good and useful book, with which the student will have no reason to regret having furnished himself.

G. J. A.

THE ENTOMOLOGISTS' ANNUAL, FOR MDCCCLVII. 12mo. London: Van Voorst. Price, 2s. 6d.

OUR gay-looking little contemporary has just arrived in time to receive a rapid inspection, but no more. It professes to be the old-established, "original" edition, in contradistinction from two other forms in which the same contents are simultaneously published; but it is most decidedly smaller in size, so the public must try to accept in simple faith the counterbalance of solid value implied by its not very bashful motto, "Vires acquirit eundo." This latter principle seems to be that on which the Editor chiefly builds his expectations of success in so energetically and indefatigably endeavouring to urge his favourite theme on the notice of the community; yet we cannot conceal an apprehension that the desired elevation, when reached, may prove a giddy one. In other words, that the novelty of rapidly appearing and naturally ephemeral publications may wear off, and the passing interest they excite disappear like the effervescence of all popular favour.

We are not going to say a word against the desire to render Natural History popular. We are most anxious it should be so; but it does look, in our estimation, very like absurdity to expect a book like the Annual to be made the ornament of the drawing-room table, and to publish a grand

"Library edition" of it accordingly. One of our friends would respectfully suggest to the Editor that when the Annual reaches *perfection* (and is thus the greatest marvel of the age), he should publish it in Royal Octavo, with ample margins, and figures of every species!

Another enigma to our short-sighted views is the actual or probable use of parading such a show of "names of British Entomologists," while it is confessed that a great number of them are only schoolboys. Our friend' the Editor, as well as divers other leading men, constantly complain of the carnal motives—covetousness, desire of notoriety, &c.—which influence many of "the brethren;" but is not this the very way to encourage those false incentives? Would it not be better to have our ranks even fewer than they are, than be recruited by mere aspirants after vain-glory?

It is our firm belief that a work like that of Kirby and Spence, which silently and unobserved developes the really innate—not acquired—tastes of the young for the subject of its charming details, has done more good, and will yet do more good, than all the periodical publications of the present day put together. Why, in the latter the names of the collectors are now of nearly as frequent occurrence to the eye as the names of the species alluded to!

And hence we are glad to see Mr. Stainton turn his attention to productions like the "Educational Sheet of Butterflies," of which a copy has been sent us. The woodcuts are admirable, and the details judiciously compiled.

The plate in the Annual, too, is very good, indeed, this year. This number also contains some papers of a superior class. Dr. Hagen's monograph of the British Dragonflies will be found a great boon to those who wish to extend their researches beyond the "fashionable" limits of *the* two favourite orders; and Mr. Janson's interesting discoveries in the ant-hills will open a new field in the already well-worked department of Coleopterous research. Among the beetles he announces fifty-four new species added to the British lists this year—a fact that will startle many, until they have perceived that a large number of the novelties were lying in the arcana of Mr. Walton's collection, and unheard of till the recent publication of his Catalogue of the Curculionidæ. The Diptera have gained a slight acknowledgment this year, in the form of Notes and Queries by Mr. Wilson Saunders; and, on the whole, we are disposed to agree with Mr. Stainton in thinking that Entomology is making *some* progress, though we are so strongly opposed to the stimulus of anything like hothouse pressure.

TYPICAL FORMS AND SPECIAL ENDS IN CREATION. By Rev. James M'Cosh, LL.D., and George Dickie, M.D. One Volume 8vo. Edinburgh: Constable and Co. 1856.

THE aim of the authors of this treatise is to prove by examples and reasoning that the world is made after a General Plan, to which every object is made to a certain extent conformable; and that there is, at the same time, "a principle of Special Adaptation, by which each object, while constructed after a general model, is accommodated to the situation which it has to occupy, and a purpose which it is intended to serve."

For many years British writers on Natural Theology were in the habit of drawing their arguments chiefly from the indications in nature of special adaptations of parts or organs to particular purposes. But when, at a more recent period, the evidences began to be discerned of a certain relation to some general type or types of structure, which has constantly pervaded all organized nature, controlling the kind and extent of those alterations which the individual parts and organs undergo in order to adapt them to their particular functions and conditions; there were not wanting writers who seized upon this discovery as a weapon to overturn the proof of intelligence and design, derived from the instances of special adaptation, and stoutly maintained that the utmost which a philosophic eye can recognise in nature is a general harmony of structure, without any evidence of such designed relation to the wants and welfare of particular organized beings. In opposition to their views, the authors argue that the prevalence of such a general order is, in itself, a distinct proof of the wisdom and design of some creative agent; nay, further, that if the instances of special adaptation be more obvious and striking arguments to common understandings, yet the evidence of a more comprehensive, or an universal plan, affords the most unanswerable demonstration of the attributes of the Creator, who conceived and has carried out that plan, throughout the immensity of Universal Space, and through all the incalculable Ages of the World's unwritten history.

And while Adaptation and Uniformity are both alike adverse to the opinion that those objects can be the works of chance, the special adaptations show that the order is not the result of an unreasoning Necessity. Taken together, as mutual complements, "they exhibit to us an enlarged wisdom, which prosecutes its plans methodically, combined with a minute care which provides for every object and every part of that object. They disclose to our faith a God who sees the end from the beginning, and who

hath from the first instituted the plan to which all individual things and events have ever since been conformed."

Every object and every event must be the effect of some creative or impulsive power. Chance and Design are, of themselves, equally inefficient to produce any effect. They are merely words used to express the presence or absence of Intelligence and Intention in the Being by whom that power is exerted. The existence of the Power must be admitted: to deny it would be a contradiction in terms. The only question remaining is whether or not that Power is connected with intelligence, and has been directed to an End. But the argument drawn from the special adaptation seems to afford a conclusive answer to this question. By means of this, we are able, in a way of induction, to arrive at a ratio of probability, indefinitely increasing, until this may be considered equivalent to a moral certainty. The study of the Eye alone would go far to establish a probability of this degree. Its exquisite construction, as an optical instrument, the contrivances by which that delicate organization is protected from contingent dangers, and by means of which it can be instantaneously turned in every direction, and adapted to near or distant vision, might alone convince us of the highest degree of wisdom and benevolence in the Maker. And this argument becomes immeasurably enhanced when we find various species of animals possessing organs of vision, formed on the same grand type, but with differences adapted to their different habits, and to the conditions in which they are placed. The authors give numerous illustrations of the manner in which the wants and instincts and organs of various animals are adapted to each other and to the circumstances of their existence; and a reference to the most ancient fossils shows that the prevailing adaptation which we perceive in existing animals is not to be explained by the lapse of time having brought about the extinction of other races in which this adaptation had not place :—

"It is seldom that the geologist finds a fossil plant or animal entire; most commonly he falls in with only a fragment, yet this fragment, if it be a significant one, enables him to reconstruct the whole. The process of theoretical reconstruction is conducted on those very principles of homology and teleology which we have shown to pervade all organic nature. The palæontologist supposes that there were answerable parts in the genus or species, and a series of homotypes in the individual; and he goes on confidently to supply the wanting parts on the principle of homology. He proceeds, too, on the principle of final cause; he supposes that the part had an end to serve, and that there would be a conformity of every other

organ to fulfil that end. By means of these two principles he can often, when he is in possession of but a fragment, make the entire organism stand before us with all its harmonies and its fitness. When at any time he falls in with an entire fossil organism, he finds that these principles are verified, and that he is entitled to proceed on them."—p. 312.

The authors animadvert upon two common and nearly-related mistakes which are sometimes made respecting the principle of development. It has been supposed, on the one hand, that, through successive Geological periods, there has been a progressive improvement in organic nature. This is not the case. The plants and animals of the earliest ages were as well suited to the conditions by which they were surrounded, and the uses which they had to serve, as the plants and animals of the present day, although they would not be so well fitted, if they existed now, to the present state of the earth, or to supply the wants of its chief inhabitant, man. But they served their purpose before they passed away; and they may be said to continue to serve one still, in furnishing another striking example of the infinite wisdom and beneficence of the Creator. They afford a warning, too, how cautious the wisest ought to be,—though *they* are not the wisest who most want this caution,—not to presume that anything is useless, or even that the uses of it which they are able to discern must, therefore, be the most important actually. Let us imagine, for a moment, one of the angels, who may have surveyed the earth at an epoch long anterior to the creation of man, to have been asked concerning the utility of the luxuriant tropical vegetation which then flourished upon the earth. He might probably have answered, by pointing out many important purposes to which it was then subservient. But no reasoning powers, of which we can form any conception, could have enabled him to predict that those plants, having undergone certain natural changes in the course of time, would become coal, and in that shape be a most important agent in promoting the comfort and multiplying the effective force of other beings afterwards to be placed upon the earth, and of a nature only a little lower than his own.

The second mistake which these authors have exposed is that of supposing that man, in any stage of his existence, is like a lower animal in its more advanced state, as if the lower animal were an inchoate man arrested in its development. It is true that animals, ultimately the most dissimilar, present comparatively few and minute points of difference in the embryo; their distinctive characters, first the more general, then the more special, becoming more and more pronounced, in gradual succession, as they advance towards their ultimate development. Conversely, we can conceive the dif-

ferences continually to diminish in re-ascending towards the first origin of the germ; until they vanish from the homogeneous particle of matter, as the uniform primordial state of every organism. Yet, even if our limited senses, with all the aids and appliances we can command, should fail at some stage to detect a difference of form or composition, we are not, however, entitled to conclude that there is absolute identity; and, indeed, the specific relation between different germs and the media, or conditions indispensable for their vital preservation and organical development, points to a more intimate, original, and permanent difference in the germs, corresponding to their respective parentage.

But although man is so unlike, and in many respects so superior to all other animals, there is nothing in his frame that is not typified by creatures whose existence was long antecedent to his; so that it may be truly said in this application, that all his members were written in the Book, when as yet there was none of them. What the final cause may be of this order and system of development, it is impossible for us to say. We are unable even fully to understand why the Omnipotent Creator should ever employ means towards an end, although we can see that those means, by their fitness and exquisite contrivance, may afford additional illustrations of His wisdom and benevolence, by furnishing to beings of the most exalted intelligence exhaustless subjects of contemplation and employment for their highest faculties.

The authors, however, are not always sufficiently careful to avoid relying upon unproved facts and uncertain arguments. They have been sometimes carried away by their prepossessions, in a way which not only offers to an opponent an almost irresistible temptation to seize upon one such instance as a specimen of all, but has a tendency to weaken the effect of the arguments which are borne out by proof, in the mind even of unprejudiced ordinary readers. An instance of this precipitancy may be found at p. 65, where the names of Bernouilli, De l'Hopital, Leibnitz, and Newton are brought in to enhance the interest the reader is to take in the Cycloid, as the line of quickest descent of a falling body,—and then comes this statement, "Now, it is believed that it is by this very swoop that the eagle descends upon its prey. The question presses itself upon us. Who taught the birds of the air the line of swiftest descent, the discovery of which was believed to test the highest mathematical skill?" But, may not the Atheist, who is more ready to discover the mote in his brother's eye than the beam in his own eye, demand why, or on what grounds, it is believed that the eagle descends in a cycloid? If it is merely because that curve is the line

of swiftest descent,—then the argument runs in a vicious circle;—the descent in a cycloid is inferred from the wisdom of the Creator, and the wisdom of the Creator is inferred from the descent in the cycloid. That such actually is the process is obvious; for who is able to tell the way of an eagle in the air? How often has it happened that any person acquainted with the definition and properties, or even with the name, of a cycloid, has seen an eagle pounce upon its prey; or who could pretend to trace with any degree of accuracy the curve that she described in that rapid swoop. Moreover, even granting the fact, still the argument is unsound mathematically, for the cycloid is the line of swiftest descent only under conditions which never do attend the eagle's swoop, viz., that the motion should be through an unresisting medium, and that the accelerating force should be uniform, when resolved, in the same parallel direction.

We wish the section on typical numbers had been omitted; for the authors appear to have fallen into the very extravagancies against which they caution their readers, indulging in language incapable of any interpretation consistent with sober reason. After reproving the tendency of some commentators to suppose a magical power, or a mystical meaning, in numbers, they go on to say—p. 519, "The existence of this mystical tendency, in premature scientific speculations, should not lead us by an extreme reaction to affirm that numbers have no significancy in nature; it should merely guard us from adopting them too readily—that is, it should prevent us from receiving them without inductive evidence, which is now, however, superabundant." And again, p. 520,—"Physical science shows that numbers have a significancy in every department in nature." They then give some examples, of which we shall reproduce a few,—"Six is the proportional number of carbon in chemistry, and 3×2 is a common number in the floral organs of monocotyledonous plants, such as the lilies of the field, which we are exhorted to consider." "Eight is the definite number in chemical composition for oxygen, the most universal element in nature, and is very common in the organs of sea-jellies." "In natural philosophy, the highest law, that of forces acting from a centre, proceeds according to the squares of numbers." Now, as regards this last assertion, it is not true that the law of gravity has any connexion with *numbers*, except so far as it is true that *every possible* proportion is capable of being at least approximately expressed by means of numbers; and as to the coincidences, some of them almost ludicrous, which are adduced, what more do they amount to than this, that among a great multitude of phenomena, involving such *small* numbers, frequent repetitions of the *same* numbers occur

of necessity. If those numbers have an intrinsic significance, surely we were entitled to expect some hint, at least, in explanation of the nature of that significance.

We have then, page 521, a burst of declamation,—"He must be a bold man who will insist that should the God who fashioned nature be pleased to give to man a revelation of His will, in order to solve certain great problems started by the existence of sin in the world, He shall not be at liberty to make his dispensations of Providence and his institutions for instruction and worship bear a certain relation to each other." No one is so bold as to make such an assertion; but it does not require much boldness to assert that the authors have failed to produce the "superabundant inductive evidence to show that numbers have a significancy in nature" in any rational meaning we can put on the expression.

We next meet with some remarks upon numbers mentioned in the Bible, p. 523. "Five is found in the pillars of the court of the temple, which were five cubits high, and five cubits apart; and in the ten virgins, five of which were wise, and five foolish." "Twelve was the number of the sons of Joseph, of the tribes of God's people, and of the Apostles." "We read of seven × ten disciples; Peter was exhorted to forgive his brother, not seven times, but seventy times seven, and the redeemed on Mount Zion are twelve × twelve thousand."

After such instances of their "superabundant inductive evidence," come the following remarks, p. 525—"We are not even inclined to look upon these recurrent numbers as implying any mysterious connection, as the sophists have supposed, between objects which have the same number attached to them." "Nor are we to look upon biblical events as related, solely because they appear under the same number. It is possible, indeed, that the events may have a connexion in themselves, and have both appeared under the same number because of this connexion; but the evidence of their relation must be sought otherwise than in their numerical correspondence. In vindicating the existence of these numerical relations we are thus, at the same time, laying an effectual arrest on the abuse of them."

Putting together the above extracts, we are compelled to ask, what do the authors mean by the significance of numbers? What proposition is it that they desire to prove by their examples of coincident numbers? Do they vindicate thereby the existence of any numerical relation that has ever been doubted by any one?

In a work like that before us, which has to deal with facts not patent to the senses in their everyday use, and with propositions addressed to in-

tellectual faculties which are brought but little into exercise, in the practical business of common life, it is, perhaps, impossible to avoid the use of some terms and phrases requiring explanation to the general reader. This is an inconvenience, which—as it cannot be entirely escaped—should be diminished as much as possible, by carefully considering, in each particular instance, whether the example, or the argument, that requires the introduction of such technical terms for its proper statement, is of intrinsic importance enough to counterbalance the objection to its use that arises out of the natural aversion of the reader to language presenting obvious difficulty, and—as it may appear to him—even studied obscurity.

The authors have, as it seems to us, deviated from the discretion they ought to have exercised on this head—at one time giving abstruse definitions of terms, which they have no occasion for afterwards—at other times, introducing unusual terms, when their argument might have been stated just as well without them. The uninitiated would be apt to think that the structure of a bird's wing might have been shown to be adapted for flying, without such an array of learned words as in this paragraph (p. 207): "It has been already mentioned, that the scapula and coracoid are, respectively, pleurapophysis and hæmapophysis of the occipital vertebra, and the clavicles or collar-bones, the hæmapophysis of the atlas, or first cervical vertebra." How different a dialect this is from the style of Paley, for example, who never presents a difficulty unless to explain it, and rarely, indeed, employs an unusual term where the sense could be given as well in words more simple. And, so far from losing in force by this condescension, the argument acquires double credibility in his hands; the easy flow of language, and the perspicuity of the phrase, being but the fitting counterparts of the judicious selection of the instances and the clear connection between all the links of the reasoning.

Again, it appears to us that an insidious use is sometimes made—no doubt unconsciously—of those hard words out of the scientific vocabulary;—thus, pp. 435-6:—"Final cause is, to say the least of it, as certain as unity of composition. It is surely as certain that the eye was made to see as that it is the homologue of the whisker of a cat. We give little credit for sincerity to those who acknowledge that they have overwhelming evidence in favour of the former truth, but no convincing proof in behalf of the latter." The intention of the authors would seem to require that the words "former" and "latter" should be transposed in the sentence—but let that pass. The argument itself seems to be a sophism depending upon the introduction of an unusual word "homologue" into one of the two

propositions which are compared together. The weight of evidence is thus made to tell, apparently, in favour of that proposition which will be most readily and most generally understood. But if we examine these two propositions abstractedly, the balance of proof, in reality, inclines the other way; since the special use which any organ does actually serve, as part of a definite organism, constitutes but *one* of the steps of that inductive process by the help of which we have to trace it through the manifold alterations of its accidental qualities, and consequent adaptation to other uses, in order to arrive at the demonstration of a constant relation to Final Cause subsisting in the indefinite variety of modifications of the functions, as well as of the texture, bulk, and form of the parts.

In the passage we have quoted last, all that is denoted by the term "Homologue" is some coincidence in the use of the organs. We strongly suspect that the authors have taken their definitions of the terms from one source, and the propositions, in which the terms are involved, from some other authority that has put a very different meaning upon them, without themselves having detected the fallacy which they have thus been labouring to construct. That the human eye and the whisker of a cat are homologues is certainly not a Corollary from the definition of "Homologue" given in page 25—"the same organ in different animals under every variety of form and function." The relation between the two, in this case, seems to amount at the utmost to an Analogy, according to the definition of an "Analogue," in the same page—"an organ in one animal having the same function as a different organ in a different animal." But much depends here upon the meaning of the word *same*, which appears to be applied, sometimes, to things totally *different*.

Indeed, throughout the whole work we have to complain of a want of precision in the authors' reasoning. The design of the work is good, but in the execution of it they appear as if resolved to bring into play every particle of learning of which they were in possession, without much regard to its bearing upon the general argument. Their professed object was to prove and to illustrate the wisdom and intelligence of the Creator—first, by useful effects being produced by means so well adapted and so complicated, that they would not be attributed to chance on any of the acknowledged principles that regulate human belief; secondly, by such instances of order and method in the universe as may afford, by virtue of those same principles, a degree of probability, amounting almost to moral certainty, in favour of the supposition of Design. Now, under this second branch, it is plain that every instance of apparent order and coincidence, which does

not arise from design, is actually hostile to their argument. The authors ought to have disposed of all such cases, by showing solid grounds of distinction between the instances of agreement which prove design, and those which may exist without it. Instead of this course, required by fairness and true logic, they have adduced both classes of facts, without discrimination; and they content themselves with adding, in some few instances, a qualification to the effect that they do not rely on them as conclusive or strong examples.

In conclusion, let us say, we shall be glad to see a second edition of this work, as well for the sake of its intrinsic merits, which are far from being inconsiderable, as on account of those defects which, by a little care, may be removed, but which at present impair, not a little, the force of the general argument which it was intended to develope. M. L.

ELEMENTARY COURSE OF GEOLOGY, MINERALOGY, AND PHYSICAL GEOGRAPHY. By Professor David T. Ansted, M.A., &c. Second Edition. London: Van Voorst, Paternoster Row. 1856.

THIS is the second edition of a Manual of Geological Science, which, on its first appearance, was very well received by Geological students. There was not much originality of thought or arrangement exhibited in it, but it was extensive in its scope, embracing Physical Geography, Mineralogy, Geology proper (or Descriptive), and the rudiments of Practical Geology. It was, moreover, brought out in a form and at a price suited to students, and as the compilation of its materials was generally well executed and moderately accurate, it was considered, on the whole, a good book. One of the highest testimonies to its practical value to the student is the fact, that it has been in use for some years as one of the text books in Geology for students in Experimental science in the University of Dublin.

In the present edition the four-fold division of the subject is retained; the Physical Geography is unaltered; the Mineralogy somewhat modified; the Geology recast as to its arrangement, not enlarged; and the Practical Geology is doubled in extent and greatly improved. A considerable portion of the interval between the editions (six years) has been spent by Professor Ansted in a professional way, as Consulting Mining engineer, and in connection with various mining companies; occupations which have afforded him means of increasing his knowledge both of Mining operations and Mining terms.

As we have not reviewed the first edition, our readers will readily excuse our entering in some detail upon the portions of this work which are unaltered, as well as upon the portions which are to be considered as additions to the first edition.

PHYSICAL GEOGRAPHY.

The first two chapters of the Physical geography are occupied with an account of Chemical and Physical phenomena, which, in our opinion, ought to have been worked up with much more care, or altogether omitted. For example, in the table of Elements, page 9, there are many inaccuracies, several of which are chargeable on the author, and not to be transferred to the printer. We take, at random, Copper, Chrome, and Silver.

Copper is said by Professor Ansted to occur ordinarily as Copper Pyrites, which is quite correct; but he proceeds to add, that Copper Pyrites is formed of *three* atoms of copper and *one* of sulphur, which is completely erroneous.

Chrome is described as commonly occurring in a compound of *four* atoms of protoxide of chrome, iron, magnesium, and alumina, known as Chrome iron; a view which is not taken of that mineral by any mineralogist, as it is well known to have the same formula as Magnetic iron, with replacement of isomorphous elements.

Again, Hornsilver is described as a bichloride of silver. We subjoin the correct formula for each of these cases:—

	PROFESSOR ANSTED.	USUAL FORMULA.
Malachite	$2\,Cu\,CO + HO$	$2\,CuO\,CO_2 + HO$
Copper Pyrites ..	$Cu\,S'_3$	$Cu\,S_2 + Fe'\,S_2\,S_3$
Chrome Iron ..	$CrO + Fe\,O + Al_2\,O_3 + Mg\,O$	$RO\,R_2O_3$
Hornsilver ..	$AgCl_2$	$Ag'\,Cl$

In the third chapter, which is one of the most valuable in the book, there are numerous tables of Areas of River Drainage, Relative areas of land and water, &c., &c., for which our author is principally indebted to *Johnston's Physical Atlas.*

He has also introduced some of the newest information relative to these subjects from Lieutenant Maury's well-known work on the Physical Geography of the Sea. We extract the following relative to the Atlantic:—

"The form and physical features of the ocean bottom of the Atlantic, between the northern part of South America and the latitude of London, are now known with sufficient accuracy to admit of general description. Down to latitude 15° north, and parallel to the European coast, is a large north and south tract from

2,000 to 3,000 fathoms deep, extending between the Canary Islands and the Azores; while a broad belt of much higher level (nowhere deeper than 2,000 fathoms, and generally much less) and of a very irregular form, reaches to about 55° west. Beyond this a very deep and almost unfathomable region, everywhere more than 4,000 fathoms, and generally more than 5,000, extends east and west between 35° and 40° north latitude, and 45° to 65° west longitude.

"The West India Islands are connected with the shallower bottom of 2,000 fathoms by soundings which nowhere exceed 3,000 fathoms, and in latitude 20° north and longitude 60° west the breadth of this shallower portion is singularly narrow. Further south there is a belt of very deep water (more than 3,000 fathoms) nearly parallel to the South American coast, and much nearer the American than the African side. The steepness of the sea bottom is generally much greater near the American coast, the depression being nearly 20,000 feet in 500 miles almost everywhere on that side, except near the Gulf of Mexico and the Caribbean Sea, in neither of which is there a depth of 1,000 fathoms in any part."—Page 28.

The account of the Geological action of the Tidal wave, given in chapter IV., is one of the least satisfactory parts of the Physical geology of the book; and we cannot help doubting whether Professor Ansted himself could explain clearly his meaning in the following sentence:—

"The tide wave is probably a very effective force with reference to the sea bottom, and the transport of solid matter in deep water. Being a wave of the first order, its velocity is far greater in deep water than in shallow; and, if it proceeded with uniformity and regularity, the velocity at a depth of one fathom being eight miles per hour, at the depth of 10 fathoms it would travel as much as 25 miles in the same time; at 50 fathoms, 57 miles; at 100 fathoms, 80 miles, at 1,000 fathoms, 250 miles; and at 4,000 fathoms, 500 miles."—Page 58.

Does Professor Ansted mean to assert that the Tidal wave travels with such different velocities at different depths in the same sea? If so, he has studied the theory of tides and waves to but little purpose. Or, does he imply, in this obscure passage, that the Tide wave is effective as a Geological agent, in proportion to its velocity? If so, we fear he has confounded two totally distinct things—viz., the velocity of the Tide wave and the velocity of the particles composing it. It is on the latter alone that the Geological or Mechanical action of the tide, as a degrading and transporting agent, depends; and not at all on the velocity of the tidal wave, which varies greatly, without any sensible alteration of the velocity of the individual particles of the water. It is scarcely possible to conceive that our author can mean that, in a sea of four miles deep, which is of common occurrence, there are tidal currents at the bottom sweeping along at the rate of five hundred miles per hour; and yet, it is difficult for a learner not to suppose that this is implied in the above sentence.

MINERALOGY.

Professor Ansted, in his preface, states that he has "carefully modified the Mineralogy, retaining, however, in the main, the former method of

arrangement, which he believes to be the one best adapted for the Geological student." With the arrangement of the Mineralogy we find no fault, as we believe it, although not strictly scientific, to be practically useful to the beginner. We could wish, however, that, in the modifications which the mineralogy has undergone, such errors as the following had not been carefully reproduced in the second edition:—

"Thus, for example, Calc Spar, in its purest form of Iceland Spar, is found to consist of

Carbonic acid . . . 43·71
Lime . . . . 56·29 } 100·00;

and if this is reduced to show the atomic relation, we shall find that the real proportion is *two* atoms of carbonic acid to *one* atom of lime, which represents the true nature of the mineral."—p. 157.

We venture to assert that there is not a lime-burner in the country, who would not become conscious of the fact in a few hours, if Professor Ansted's description were to become true of Calc Spar.

To show that the foregoing is fairly attributable to ignorance of Dufrénoy's meaning, from whom it is translated, and not to accident, we subjoin the following additional elucidation:—

"In the case of Iceland spar, already mentioned, the mineral may be regarded as made up of *two* compound atoms of carbonic acid and *one* of lime—the compound atoms consisting in the one case of two atoms of oxygen and one of carbon, and in the other of one atom of oxygen and one of *carbon*."—p. 159.

A detailed blunder of this description is far more dangerous to the learner's progress than a simple mistake, as it produces upon his mind all the effect of a circumstantial falsehood, which is well known frequently to deceive even the expert.

Such lamentable ignorance of the elements of Chemistry, would be very unpardonable in a teacher of Geology, were it not, unfortunately, very common; and we mention this and similar cases which have occurred to us, on a hasty perusal of this book, simply to place the reader on his guard, not to take everything for granted which he may see in print, and not at all with any wish to detract from the real merits of the book, which we believe to be considerable.

We go on to notice a few more errors in the Mineralogy, with the hope that they may be corrected in a new edition.

In page 177, Meerschaum is described as an earthy and siliceous carbonate of magnesia. It is an Hydrated silicate of Magnesia, and contains no carbonic acid.

In page 217, Vitreous copper ore, or Redruthite, is described as Bisulphuret of copper. This is not correct, and shows a want of knowledge of Chemical nomenclature. It is a Disulphuret of copper.

Page 219. The oxide of copper which enters into the composition of Azurite is called "oxide of copper, 70 per cent;" while, in the same page, the oxide of copper entering into the composition of Malachite is described as "Deutoxide of copper, 70.5 per cent." We are at a loss to understand this difference in names, as the oxide is the same in both cases, viz. CuO.

In page 223, the error respecting Hornsilver, already noticed, is repeated, although the correct atomic weight of silver is given in the table, page 9. Mistakes of this kind arise from the indiscriminate copying by incompetent hands from the works of others, as this formula $AgCl_2$, may be justified by writers who adopt 216 for the atomic weight of silver, which is double that used by Professor Ansted, viz., 108.

By far the most serious difficulty to the student in this Mineralogy is likely to arise from the confused and sometimes inaccurate use by Professor Ansted of both the Chemical and Mineralogical formulæ of Minerals. This, also, we suspect, arises from his having extracted his information from various sources, and transferred it quite undigested to the pages of his own book. In some instances, where we can recognise a literal translation, he has transferred errors and truth together, and given them equal prominence, to the serious detriment of his inexperienced readers.

Notwithstanding the errors we have pointed out, we believe that the Physical Geography and Mineralogy, although at present inferior, are capable, by a careful revision by a thoroughly competent hand, of being made equal to the rest of the book. Professor Ansted is evidently more familiar with Descriptive Geology and Mining operations practically than he is with the Mechanical considerations requisite in Physical Geology, and the Chemical knowledge, without which no real progress can be made in Mineralogy.

We are of opinion that on a subject like Geology, of a practical character, no man can write well who does not himself possess a practical knowledge of the particular branch he treats of; and hence, we believe, can be explained the unequal character of Professor Ansted's book.

DESCRIPTIVE GEOLOGY.

The statement of the preface that the Descriptive Geology has been "entirely re-arranged, and for the most part re-written" is only accurate when applied to the last three chapters of this part of the book, as the first three chapters are almost identical with those of the first edition. In fact, the original plan of the book, which tied down the author to write so as to suit second-hand illustrations borrowed from Beudant's "Cours Elementaire de Geologie," almost precluded the possibility of alteration or improve-

ment in certain parts of the book. We cannot too earnestly or too frequently give our testimony against this growing vice: we do not think it is endurable, except in a translation; and an author who condescends to write his text to suit his diagrams is not unlikely to borrow his ideas as well as his woodcuts from others.

By far the most valuable addition made to this part of the Descriptive Geology is the Table of extinct Genera founded on Mr. Morris' valuable Catalogue of British Fossils.

In the last three chapters of the Descriptive Geology, Professor Ansted has adopted the Natural method, viz., proceeding from the oldest epochs to the newest; for, notwithstanding the high authority of Sir Charles Lyell in favour of the opposite course, we consider that Geology, which is the History of the Earth, should be treated like other Histories, and commence with its period of Myths and Fables, its nebular Hypothesis, and Cosmogony, its Azoic Rocks and Crystalline schists, before it enters upon the beaten path of the Secondary and Tertiary Epochs. What should we think of a History of England which commenced with the reign of Queen Victoria and in which we could not read of the good Canute sitting on the shore of the sea in his own chair until we reached the last chapter.

Of this interesting, because unknown, epoch of the Azoic and immediately subsequent rocks, he writes as follows:

"603. Rocks called by Sir R. Murchison and others *azoic*, as not at present yielding any evidence of life at the time of their formation, are found in Wales occupying an intermediate position between crystalline and fossiliferous rocks. These lowest rocks include the *Harlech grits* and *Llanberis slates*. They are represented in Ireland (on the coast opposite the Isle of Anglesea) by similar rocks, in which remains of two species of zoophytes are found. These are both referred to the same genus (*Oldhamia*), and at present they are the most ancient forms of organisation that have been determined. The rocks consist of contorted schists, of the kind called by German Geologists *grauwacke* (anglicised into *greywacke*), fine and coarse grits and fine purple roofing-slates, largely worked in North Wales, altered in places into chloritic and mica schist, and in others into quartz rock. The pre-existing masses out of whose materials these beds were formed have not yet been found in the British Islands, although in Bohemia and in North America there are crystalline rocks, which, from their underlying position, are known to be of still higher antiquity. The thickness of the oldest mechanical rocks in Wales (the Harlech and Llanberis series) is estimated at 1,500 feet.

"604. Next in order, and also exhibited in Wales, are the *Lingula flags* (about 2,000 feet thick, containing peculiar fossils, and consisting chiefly of gritstones and schists with imperfect slaty cleavage passing into the sandstones and fine quartz rock of the Stiper stones in Shropshire. Above these are the *Tremadoc slates* (1000 feet), and above these again the *Arenig slates* and *Arenig porphyries* (7,000 feet). In all this great thickness the fossils hitherto found are very sparingly distributed, and the number of species is very small, but a difference is recognised between these species and those of overlying rocks. The Lingula (a small bivalve shell) is the most common fossil; but there are also two small trilobites, a shrimp-like crustacean, and a zoophyte.

"The beds above described are sometimes called *Cambrian*, but, as already explained, it is difficult to separate them with propriety from the Silurian series."

In the Journal of the Geological Society of Dublin, which is printed in the present number of the Natural History Review, is a paper by J. R. Kinahan, Esq., M.B., announcing the addition of a fresh and interesting group of animals to the solitary Oldhamias of Bray Head; we take this opportunity of directing our readers' attention to it, as we believe it to be a valuable addition to the scanty knowledge we possess of the Organisms of the Cambrian Epoch.

An interesting question is alluded to in the closing paragraph of section (603), already quoted; viz., where are the original rocks whose wear and tear supplied the materials for the vast thicknesses of beds deposited during the early Silurian Epoch?

In connexion with this inquiry, we subjoin the following passage:—

"609. Commencing with the crystalline and altered slates of Cumberland, North Wales, Scotland, and Ireland, it may be observed that the proportion of argillaceous matter and quartz is much greater, and the mixture with calcareous rocks less, than in strata of more recent date. Although of a thickness amounting to many thousand feet, the sedimentary deposits forming the base of the Silurian system are, almost without exception, composed of clay, pebbles, or boulders, and siliceous sand; while the frequent presence of mica seems to indicate a preponderance of granitic rocks amongst those to whose degradation and disintegration this long series of crystalline slates, mica-schists, micaceous sandstones, conglomerates, imperfect and highly altered limestones, and quartz rock must be owing.

"The unvaried character of these beds over large tracts of country, and the general resemblance among the oldest sedimentary deposits, have been looked upon as a strong argument in favour of the uniformity of the materials of which the original framework of the solid surface of the globe was composed."

The theory of "Contemporaneous Traps" now generally adopted would suggest a source from which part, at least, of those vast deposits might be derived; but the greater portion of them must have had their origin in the Mechanical degradation of pre-existing rocks. Where and what are these rocks? We feel disposed to agree with Prof. Ansted as to the large quantity of Mica in the Silurian Slates, as such a quantity of Mica must be accompanied with a corresponding proportion, more than one-tenth, of alkalies (potash); and such an amount of alkalies is usually found to exist in ordinary slates. It is, however, a subject not sufficiently examined, and well worthy of attention. And it is worthy of consideration whether the Mica in the more crystalline of the Azoic rocks be not due to metamorphic action, and not to the degradation of granitic rocks. Be this as it may, the fact is certain that in Great Britain and Ireland we do not see the primitive rocks whose wear and tear supplied the elements of the slates of Wales, Cornwall, Cumberland, Down, Armagh, and Kildare.

The granite of Cornwall is of carboniferous date in all probability; the granite of Leinster is post-silurian, although ante-carboniferous; the granite of Down is post-carboniferous; and that of Donegal is, probably, also carboniferous, or only somewhat antecedent in age. Where, then, are the presilurian Granites which supplied the materials of the thick masses of slate we have mentioned?

Ordinary Granites consist of about 25 per cent. of Quartz, 60 per cent. of Felspar, and 15 per cent. of Mica. When such a rock is exposed to the action of water and converted into a stratified rock, its felspar loses its alkalies, while the mica remains nearly unaltered, and the resulting rock will be a compound of Impure Kaolin, Quartz, and Mica, mixed in proportions not absolutely fixed, but, probably, never very far from the following: Quartz 25 per cent., Kaolin 18 per cent., and Mica 57 per cent.

Another circumstance which characterises the early Silurian slates is the small proportion of lime and magnesia found in them; this falls in well with the supposition of their being derived altogether from Granitic Rocks. It is certainly a curious fact that the quantity of lime in the crust of the earth increased with the increase of organic life, and, also, probably, the quantity of soda and phosphorus—as if some change of mineral conditions of the surface of the globe had rendered it more fit for the habitation of organised beings.

We must, however, return from this digression to Prof. Ansted's book. One of the most interesting parts of the fifteenth chapter is the description of the Oolitic coal fields, including the remarkable beds of India, pp. 375–380. From the specimens of fossil plants recently sent from the Rajmahal Hills, there can be little doubt of their being more closely allied to the Oolitic coal plants of Scarborough than to the vegetation of the true carboniferous epoch. The Palæontological portion of the book is respectable; the text written to suit the woodcuts, as before; but there is nothing in it which calls for special praise or mention.

PRACTICAL GEOLOGY.

We regard this portion of the book as the best written and most useful Manual of Mining with which we are acquainted, in the English language; and we think that it supplies a valuable aid to the student of Mining Engineering. It is fairly entitled to be considered as a new addition to the former edition of this book, as it is doubled in extent, consisting of one hundred and twenty-three pages, instead of sixty-one, and the whole is carefully arranged for the use of students. S. H.

Retrospect of various works published during the last Year, New editions, and New works in progress.

The demands of a still increasing number of Zoological, Botanical, and Geological communications, in the pages of various foreign Serials, which call for our notice, as they are more liable there to lie hidden from the knowledge of British Naturalists, than the more considerable and independent works of Natural History, that issue from the press at home or in other countries, have circumscribed the space we could afford to reviews of the latter class of works, and limited the number of our articles in this department. In compensation, we propose now, at the commencement of a new year, to indulge ourselves in a lightly skimming retrospect of the scientific literature of the year 1856, as it bears upon the study of the native Fauna and Flora in particular. But even here, we are obliged to set certain bounds to ourselves; so, passing by various splendid illustrated works in progress, and many of another sort, devoted to the Vertebrata and Mollusca, as well as those upon General Botany and Paleontology, we will descend at once to the Articulata, and commence with the different orders of Insects.

I. Diptera. We have elsewhere inserted a critique of Mr. Walker's volumes, intended to serve for a British Fauna of this order, the last of which was published the beginning of the year. The same indefatigable hand has brought out the concluding part of the Diptera Saundersiana also, in the course of the same year, while two other articles, also by him, in the Journal of the Linnean Society, from materials supplied by the same rich collection, make known fresh harvests of Mr. Wallace's gathering on the virgin soil of Malacca and Borneo, and afford a proof what unexplored treasures are yet in keeping for the students of this order, when voyagers and travellers shall have better learned not to overlook so much the less obtrusive and more fragile races of flying insects, for the gaudier charms of the beetles and the butterflies. It is not long since we gave, in this Journal, an article on Recent Works upon the Diptera of Northern Europe, and we expect it will not be very long before a like call is made upon us in the name of those of Southern Europe. The lists of Austrian Diptera by Dr. Schiner, on which Dr. Loew has expressed such a favourable judgment (see the Volume for 1856, page 92), are proceeding through the different families in succession, and we have lately received, besides, a small volume by Prof. Rondani of Parma, the welcome forerunner of a general work

which he has undertaken on the Diptera of Italy, from which country many interesting accessions to the European Fauna of this order may reasonably be looked for.

II. Lepidoptera. The most interesting intelligence we have in the Bibliography of this order is the completion of Dr. Herrich-Schaeffer's great and sumptuous work. Prof. Frey of Zurich has produced a modest and meritorious volume on the Tineæ and Pterophori of Switzerland, which will be useful to the British "Tinearist" also, though possessed already, as we may assume him to be, of Mr. Stainton's volume on the British Tineina. Of the last-named author's polyglott Natural History of this tribe, sufficient materials have not yet accrued, as it seems, for the publication of another of the annual volumes. The Manual of British Butterflies and Moths also is to take a deliberate nap at the end of the Noctuina and the beginning of the year, while awaiting the appearance of Guenée's work on that group, shortly to be forthcoming in Roret's "Suites a Buffon."

III. Hymenoptera. Dr. Nylander has given a Monograph of the Formicidæ of France, in the "Annales des Sciences Naturelles," wherein he has reduced again several of the new genera, which Mayr had dismembered from Myrmica, chiefly by distinctions drawn from the varying number of joints of the palpi. From Ruthe we have the promise of a Monograph of the Braconidæ of Germany, which is likely to be valuable, both from his copious materials and the minute accuracy of his investigation, judging by the specimen he has given in the groupe of Microctoni. At home, we have no important accession to the literature of this order, except the British Museum Catalogue of British Ichneumonidæ, by Mr. Desvignes. We have not yet had the opportunity of examining it, but we feel assured beforebeforehand of its utility, from the author's thorough knowledge of his subject.

IV. Coleoptera. If for a republication of a standard work of Entomology generally, Kirby and Spence's Introduction is the best value for the lowest price we know; so are Lacordaire's volumes on the Genera of Coleoptera the cheapest of an original work. Estimated by the labour and materials they must have required, the information condensed in them, and the time and pains which they save the student, were it only as an index to the species, they would be worth their weight in silver at least. The third volume, containing the genera of the Pectinicornia and Lamellicornia, has appeared, and we have reason to hope that the fourth will speedily follow.

To all the students of this order among ourselves, a long-desired and very welcome acquisition is the first part of a revised list of the Rhynchophorous beetles of Britain, Bruchidæ—Curculionidæ, by Mr. Walton,

lately published as another of the Blue books of the British Museum. We have noticed, also, with much satisfaction, the Monograph of the European species of *Catops*, by Mr. Murray, in the Annals of Natural History, illustrated with many wood-cuts, exhibiting the minutiæ of sculpture, the microscopical investigation of which he has here applied to the discrimination of the species of this rather perplexing group, and has carried it out to a degree of refinement hitherto unattempted for the purposes of Descriptive Entomology. Although no independent work, of any extent, on this order has issued from the press in Britain, during the past year, yet the Entomologists' Annual, continued for 1857 by the enterprising and persevering editor, bears witness that the study of the indigenous species has been pursued with commendable zeal, the additions to the British Fauna in this order, for the year 1856, amounting to not less than sixty species, two of which, however, are stigmatised with a note of suspicion, as possible "importations."

Mr. Stainton informs us—and who should be better authority than the Editor of the "Entomologist's Intelligencer"—that there is at present a cry out for a "Manual of British Beetles." How much this clever writer himself, and his "Manual of British Butterflies and Moths," may have had to do with exposing the want, and suggesting the feasibility, of such an undertaking, and thus evoking that importunate voice which pursues him, as he confesses, even to the shades of Lewisham, it is not necessary now to inquire. We should be sorry if we were—most erroneously—accounted unfavourable to anything tending to make the science more popular, and to aid the amateur collector in giving to his gatherings both a local habitation and a name. On this head we are quite at one with our valued contributor, Dr. Loew, whose remarks the reader will find in the volume for 1856; see page 68, and elsewhere in the same article. Still, we would venture to deprecate anything like a hasty compilation of the sort referred to, got up merely to meet the supposed demand. It is not unnatural to conjecture that such a Manual would probably be framed on the model of Mr. Stainton's popular monthly issue for the benefit of the Butterfly-collectors. Now, although the Lepidopterist of to-day is scientifically much in advance of the "Aurelian" of the last generation, still the study of the Coleoptera has kept its vantage-ground in the literature of Entomology; and it demands to be treated accordingly. A writer on British Coleoptera, who, confining himself to his local materials, should at the same time indulge in changes of the system and nomenclature, in accordance with his private views, as to parts of his subject which he had perhaps studied almost for

the first time, when he thought of setting about to teach others; views which—however original and just they might be—the concise and popular treatment of the subject, imposed on him by the form of his work, would not allow him to prop up with that copious array of exposition, illustration, and definition, which is requisite for the introduction of new aphorisms,—a writer, we say, in such a case, would be too apt only to embarrass that class of readers on whom he calculates, and would certainly do much less to promote the study of the science, than if he had contented himself with adopting some approved arrangement of the European Coleoptera, and giving so much of the distinctive characters, in the analytic form,—or any other that he might consider more suitable,—as would give a clue to the received names of the species and their position in a more general system. If, on the other hand, the intending author of a Manual of British Beetles should conscientiously purpose to acquire—if he do not possess it already—that thorough knowledge of the classification and specific distinctions, of which he has to give the practical results in a brief and familiar form, suitable to the wants of the numerous body of collectors, who have little time for study, and little mastery of the minuter technicalities of Zoological science,—it may be questionable whether the time is indeed yet come for attempting a work of such large scientific exigency, on the basis of a limited Fauna like that of Britain, while important new works, destined to do a like service for the more copious Fauna of Continental Europe, are in progress, and yet far from their completion. For our own part, as mere amateurs in the matter of the native Coleoptera, we are disposed, for the time being, to rest content with Stephens' Manual, and that gradual revision of it, which the families are undergoing in succession, at the hands of Messrs. Walton, Dawson, and Clark, Waterhouse and Jansen, Murray, Wollaston, and others.

To those who desire a more comprehensive book of reference—if they can read German with any degree of facility, we would recommend Redtenbacher's Fauna Austriaca, as a very useful guide; the intrinsic scientific merits and originality of which have perhaps hardly received their due meed of acknowledgment, in consequence of the professedly popular purpose for which it was composed, and which it has so well answered. We are happy to hear that a New edition is about to appear, in which, besides numerous additions to the list of the proper Austrian species, those of the rest of Germany—which in the first edition were huddled apart into an Appendix—will be embodied in the general analytical tables of the text.

A work which promises to become still more useful to the British Cole-

opterist—*first*, as it is not so strictly confined to the dichotomous method, with its, apparently inevitable, occasional ambiguities;—*secondly*, because the territory of the Fauna agrees with Britain better, in Geographical meridian and Hydrographic circumstances,—is the "FAUNE ENTOMOLOGIQUE FRANCAISE, COLEOPTERES, par MM. Fairmaire et Laboulbéne," of which we have lately received the third part, completing the first volume of 665 pages, 12mo., giving brief but clear characters of two thousand and forty French species, besides many indigenous in the neighbouring countries—Britain among the rest—which are considered not unlikely yet to be found in France; the whole arranged under convenient sections descending from genus to species, and illustrated with ample data, in the most concise form, respecting the local distribution within those limits. As a matter of course, this work comprehends a far greater multitude of species than are known in the British islands, and among them many southern types, not to be looked for here at any time. But of the actually known British species, there appear to be comparatively few not included in it. A general collation of the work—so far as it has been carried—with Stephens' Manual of British Beetles—or, indeed, with any other complete list of the indigenous species of this order, which we possess as yet—would lead to a very erroneous estimate of the proportion. We have confined ourselves to the comparison of a single family, one of the most extensive and most thoroughly investigated, and which, of all the great families of the order, has been earliest made the subject of a complete revision, subsequent to the date of Stephens' Manual.

Of the two hundred and ninety-two indigenous species of Geodephaga given in Dawson's Manual, we find but twenty which are not described in the Faune Française; and these are mostly of very limited local range, or extreme rarity; one-third of the number being species first and recently characterised by Mr. Dawson himself, all of which, perhaps, can scarcely be considered as yet sufficiently "ventilated." We apprehend, too, that the number not in common to both will be yet further diminished by the supplemental additions promised; and the authors seem disposed, as they advance, to be more liberal in the indication of the *probable* natives of France, so that the proportion of deficiencies is not likely to be increased, at least, in the families to follow.

The first volume of this Fauna of France, now published complete at fifteen shillings, has those two thousand and forty species, distributed under the following families: Cicindelidæ 12 species, Carabidæ 590, Dytiscidæ 149, Gyrinidæ 10, Hydrophilidæ 88, Histridæ 94, Silphidæ 113, Trichop-

terygidæ 34, Scaphididæ 5, Scydmænidæ 31, Pselaphidæ 47, and Staphylinidæ 867 species, besides those introduced incidentally, in the manner aforesaid. The authors have been in correspondence with their fellow-labourers,—the continuators of Erichson's Insect Fauna of Germany, which we have to notice also presently;—and, accordingly, the new groups, therein proposed by Kraatz, for the better determination of the difficult tribe of Aleocharini, are not left undistinguished in the French text. The most accurate determination of the species, and of the trivial names according to their legitimate priority, has been taken from the recent monographers who have treated particular families most carefully in these respects. Where such help has been wanting, the authors do not seem, indeed, to have used as much diligence or judgment in their more extensive work as Mr. Dawson has done in his Monograph, in regard to the latter point at least; but as they have ventured to exert less original decision, so they have laid themselves less open, perhaps, to common-place adverse criticism. It appears that they recognize in general sound principles of scientific nomenclature and chronological precedency, but they have by no means invariably adhered to these in practice.

We are not prepared, indeed, to blame them for having retained—whether deliberately or from mere traditional habit—the modern trivial names of many species, to the exclusion of the more ancient, but now unfamiliar ones of the last century; as for example—Carabus monilis (catenulatus *Scop.*); C. catenulatus (purpurascens *Payk.*); Loricera pilicornis (caerulescens *Linn.*); Chlaenius holosericeus (tristis *Schaller*); Feronia striola (atra *Vill.*); Anchomenus prasinus (dorsalis *Bruennich*); Trechus paludosus (rubens *Fabr.*); Bembidium guttula (riparium *Payk.*); Noterus crassicornis (clavicornis *Deg.*); Hydroporus pictus (punctulatus *Mueller*); H. lineatus (velox *Mueller*), and several others; where our own inclination would have been to restore the ancient names, which are assignable without any reasonable doubt in *most* of these cases. A point at which they have laid themselves more open to criticism is, that for want of antiquarian research, they have adopted some changes of the commonly received nomenclature, which do not yet attain to the ultimate Q. E. I. of the very earliest scientific nomenclature. In such cases they must be judged to have parted with a confessed advantage, for the sake of a supposed greater, but eventually an illusory gain. We take for an instance Carabus angusticollis *Fb.*, reduced to assimilis *Pk.*, the earlier of *these* two names undoubtedly, but Scopoli had described the species long before, and characteristically, as C. junceus. Micralymma johnstonæ *Wwd.*, the typical name, has fallen

a sacrifice to its identity with Omalium brevipenne *Gyll.*; here the authors should have gone back further still, to recognize in this species the Staphylinus marinus *Strœm.* Arpedium humile, of Erichson's classical work on the Staphylini, appears here—upon what principle we can hardly guess—under the more recent trivial name of myops *Hal.*; but it has escaped them that this insect, so common on Ulex wherever the plant grows, was *first* described by *Stephens*, as Omalium subpubescens.

We observe that Mr. Jacquelin-Duval, the pains-taking monographer of the Bembidia of Europe, has been rather severe on both Mr. Dawson and the authors of the Faune Française; because they have chosen to depart from his conclusions in some cases, without having had as copious materials as he at their disposal. The critic seems to have taken his objects clearly at a disadvantage on one or two points; but we protest against the general spirit of his attack, which goes to confound credibility of testimony and infallibility of judgment, treating a difference of opinion as little short of a personal affront.

While we desire to introduce the Faune Française to English Entomologists, who want to name their collections of Coleoptera on some authority better accommodated to the actual progress of the science than we can aver Stephens' Manual now to be; we must not pass over, without notice, one inconvenience in the use of it, resulting from the want of an index of the species to the first volume. It is, no doubt, intended to give a general index at the end of the complete work; but that may be rather long to wait for such an almost necessary save-time. The authors seem already to have discovered that the pace at which they originally proposed to bring out the parts was impracticable, having regard to the proper preparation of the matter. The first part came out in 1854; the third, which completes the volume, has not been very many weeks in our hands: nevertheless, the several Parts, as well as the title-page of the Volume, bear the date 1854. This "dies præpostera" is a petty artifice, which we regret to see sometimes practised by the French authors and publishers in particular, "pour prendre date." We would, with all becoming diffidence, venture to recommend for imitation the conscientious practice of some other writers—J. Curtis for example—who have attached the date of actual publication, not only year and month, but the precise day of the month, to every single plate which came out in periodical parts.

Later in its commencement than the Faune Française, but of much deeper scientific import, and more comprehensive in its scope, is the continuation of Erichson's Insekten Deutschlands, undertaken by Dr. Schaum

and Messrs. Von Kiesenwetter and Kraatz, all of them already favourably known by various contributions to the history of this order, or to systematic Entomology. The division of labour in this case gives hopes that we may see the accomplishment—neither hurried up at last, nor degenerate from its origin—even of an undertaking under which the delicate health of the lamented Erichson early succumbed. The three parts before us are Part I. of Vol. I., the commencement of the Carabidæ, by Dr. Schaum, and Parts I. and II. of Vol. II., by Kraatz, embracing the Aleocharini.

The genera of this tribe are separated by such subtle characters, that the student may find himself sometimes compelled to renounce the direct investigation according to the method of Erichson's excellent Monograph, and to betake himself to an empirical comparison of several alternatives, in order to arrive approximatively at the place of the species he is investigating; unless he can spare the time, and has also acquired the manual dexterity, necessary for a satisfactory microscopical investigation of the oral organs. Accepting, as we feel obliged to do, this difficulty as inseparable from the great multiplicity and close affinity of the forms, the inconspicuous size and little variety of secondary qualities, among the Aleocharini in particular, we cannot deny to Kraatz praise for having availed himself, to the utmost, of this imperative though difficult branch of investigation, for the better definition of the genera, and the separation from them of sundry discordant species. He has here subdivided the Aleocharini into three sections—I. *Genuini* or Brachypalpi; II. *Gyrophœnini;* III. *Gymnusini.* Under the first of these, the following new genera are characterized—*Stenusa* type Silusa rubra Er.; *Stenoglossa*, type Homalota semirufa Er.; *Ischnoglossa*, including Aleochara prolixa Gr., &c.; *Leptusa*, for species of Oxypoda and Homalota of authors, as Aleochara analis Gyll., Homalota piceata Muls. &c.; *Thiasophila*, Aleochara angulata Er., &c.; *Homoeusa*, Euryusa acuminata Mærkel; *Haploglossa*, Aleochara pulla Gyll., &c.; *Dasyglossa*, Oxypoda prospera Er.; *Hygropora*, Ox. cunctans Er.; *Ilyobates*, Al. nigricollis Gr., &c.; (the g. *Callicerus* Gr. is restored); *Chilopora*, Calodera longitarsis Er., &c.; *Ocyusa*, Oxypoda maura Er.; *Phlœodroma*, a new species; *Tomoglossa*, Homalota luteicornis Er.; *Schistoglossa*, Hom. viduata Er. Of the Gyrophænini, Gyrophæna lævicollis of the Author now constitutes for him a new genus *Agaricochara.* Lest any one should fancy that a multiplication of genera so considerable as this may have left none of the old ones of comfortable amplitude, we may refer to the genus Homalota, as it stands here, with a hundred and forty-two species left for Germany alone. Possibly the propensity of the author may be *rather* towards the separation of

species on slight characters. We observe that he adheres to his previous opinion that the *Phytosus nigriventris* is a distinct species, and not the other sex of *Ph. spinifer*, as English authors have considered it;—and on this head we have no decisive observations wherewith to oppose him. Again, he characterises the *Aleochara obscurella* of Thomson, from the Swedish coast, as a distinct species, by the name of *Al. grisea*. The distinctions he has assigned are so minute, and most of them merely comparative, that we scarcely venture to pronounce confidently that the common species of the British coasts represents this *Al. grisea*, as is most probable. If Kraatz is right in separating them as species, the *Al. obscurella* of the Faune Française is probably identical with the British and Swedish species. Kraatz again seems to imagine that the sexual difference of size may indicate yet another species to be separated from Al. obscurella. We suspect that the authors of the Faune Française have been led, in the like manner, to multiply species unnecessarily in some instances;—thus the characters given of *Diglossa submarina* seem rather unsatisfactory, and some of the supposed differences between this and *D. mersa* are confessedly inconstant.

Dr. Schaum in his descriptions of Carabidæ, in the part before us, has expatiated on the subject of varieties to such a degree as threatens to make the first a very ponderous volume, if he goes on as he has begun here. It must be confessed, however, that the treatment of the nominal species of this great genus, previously, had been such as to leave much rubbish for the critic to clear away. Forty-eight pages of this part are devoted to the characteristic of the thirty species of Carabus, which are admitted as genuine species, and natives of Germany. More valuable yet, in our eyes, than these special details, however elaborate, are the learned author's generalities on the families and on the classification of the order. Commencing with the carnivorous beetles, he has reverted to an older view than that now generally received, in excluding the family Gyrinidæ from the united group of land and water carnivorous beetles, the Adephaga of Clairville. Of Kiesenwetter's share of the undertaking no part has yet appeared.

It would be hard to overrate the prospective utility of this work to the scientific Entomologist; and we heartily wish it a steady and uninterrupted progress, and an increasing number of readers. For the convenience of the mere British collector, the Faune Française will, probably, be found the more suitable, as it will certainly be far the most portable, if both works are continued on the scale commenced respectively. We can scarcely wish it were otherwise, as there is occasion for *both* of these

attempts to supply much-felt existing deficiencies; and while each is particularly accommodated to its own circle of readers, they may both be serviceable to *all*, as mutually supplementary. We reserve for a future occasion a more particular critical examination of them, when further advanced towards their completion respectively: our object now has been only, or chiefly, to bring them under the notice of British Entomologists, who are discontented with the home-made provision for the wants of the Beetle-collector, and desirous of some stronger food to promote scientific growth. While *they* are only in progress, we recommend, for present use, Redtenbacher's book, as already complete in its own sphere of investigation, and as approved by our private experience, in its application as a guide to the correct and easy determination of the great majority of the British beetles also.

V. Neuroptera. There has been a lull, as if of exhaustion, in this order, since the appearance of Fischer's excellent Monograph of the European Orthoptera; Fieber having only followed in the wake of that, and Von Brauer's investigations being concerned with Physiology more than Taxiology. The Entomologist's Annual, again, furnishes British collectors with a popular description of the native Libellulidæ by a master in the science, Dr. Hagen. Mr. Stainton deserves their best thanks for the effective aid he has enlisted on behalf of British Entomology; and we hope to see many more such contributions introduced to home readers, through his intervention.

VI. Hemiptera. The system of Heteroptera, in the completed work of Hahn and Henrich-Schæffer, has been receiving large additions, both in genera and species, at the hands of Staal, chiefly from the materials collected by Wahlberg in Caffraria. Kirschbaum has added materially to the European species of *Capsus*, &c., in his list of the Capsini of Wiesbaden. The illustrated Monograph of Aphides, by Koch, seems to have come to a stand still. We have been looking out in vain, also, for the promised volume on the British Hemiptera, by Mr. Dallas, which was to have preceded the concluding volume of the Diptera, in the series of "Insecta Britannica." Although Mr. Walker's volume is out, and Mr. Dallas makes no sign, we hope the other is not superseded, but only lying by awhile, to ripen more completely.

In general Entomology, probably the most important production of the past year has been the Seventh edition of Kirby and Spence's Introduction, which we reviewed at the time of its appearance; while the most *novel*, undoubtedly, is a weekly newspaper for Entomologists, which, we perceive,

the spirited editor proposes to continue, during the next season also, in spite of the loss incurred on a weekly penny paper addressed to a reading public so limited.

We understand that Mr. Curtis is occupied in preparing a new collected edition of his Reports on Insects noxious to Agriculture, originally contributed to the Journal of the Royal Agricultural Society. It is a subject of congratulation that these valuable papers will thus be rescued from the comparative oblivion in which they were buried there, in consequence of the very limited interchange of their respective knowledge which takes place, as yet, between the Farmer and the Naturalist. It is an exemplification of this, that Nœrdlinger, in his new and pretty copious work on the "Little Enemies of Agriculture," has not derived any of the materials from the numerous essays in English on this subject to be found in the above-named Journal and in the Gardener's Chronicle. Zoologie Agricole, par E. Blanchard, which includes the insects noxious to the crops, has been continued in monthly parts.

In Insect Physiology we have a paper on the Respiration of Insects, by Mr. Lubbock, in the Entomologist's Annual, professedly popular rather than profound; an interesting communication, by M. Hicks, in the Journal of the Linnean Society, on a peculiar structure observed in the Halteres of the Diptera, which, on this ground, he concludes to be organs of sense,—as also certain parts at the base of the wings of insects in general, wherein a similar structure may be traced. The latest number of Siebold's Journal of Scientific Zoology contains some valuable observations by Stempler on the development of the Scales of the wings and other parts, in the Lepidoptera, establishing more particularly than had been done before the perfect analogy, in origin and growth, between this kind of covering and the more usual form of the *hairs* of the Articulata; which latter type has been investigated morphologically by Menzel, in a paper in the Stettin Entomological Journal of 1856, as well as in some previous separate publications.

Crustacea. Several important additions to the Literature of the Class have appeared during the past year; chiefly in Wiegmann's Archives of Natural History, and the Proceedings of the Swedish Academy of Science, and of the Danish Royal Society. On the Entomostraca we have a paper by Mr. Lubbock in the Transactions of the Entomological Society of London, and another by Fischer in the Transactions of the Bavarian Academy, both illustrated with numerous figures.

Arachnida. An essay on the Chernetidæ (Pseudoscorpii,) by Dr.

Menge, in the Transactions of the Natural History Society of Dantzig, is noticed elsewhere, in the Reviews of Foreign Serials.

ANNELIDA. The Embryology and Alternate generations of the Intestinal worms have been yet further elucidated in various quarters, chiefly by Siebold, Kuechenmeister, Leuckart, Beneden, and Philippi. An interesting popular sketch of the recent discoveries in this province of Natural History, which have excited such a lively interest, has also been given by Mr. De Quatrefages, in the Revue des Deux Mondes. The Prize in Physical Science, which was offered for the best account of the structure and development of the common Earthworm, having been awarded to Mr. Udekem, his essay has been included in the publications of the Belgian Academy.

PROTOZOA, ETC. The phenomenon of Encystment has been demonstrated, in some additional instances, among the Infusoria. For a valuable contribution to the Natural History of Spongilla we must refer the reader to the original paper by Lieberkuehn, in Mueller's Archives of Anatomy, which we have noticed elsewhere, among the Foreign Serials.

A translation into English, from the German edition, of Van den Hoeven's Manual of Zoology, by W. Clark, and also one by Dr. Knox, of Milne-Edwards' Elementary Course of Zoology, from the latest French edition, have recently appeared. Of the two volumes which compose the former work only one has yet come out in the English, embellished with the same plates as the German edition, and costing, singly, as much as the latter does complete. Milne-Edwards' admirable text-book is now, for the first time, given, in an English dress, in its integrity—even the most glaring blunder of an unlearned compositor being faithfully reproduced;—but it has long been familiar to us, in substance, through the medium of extracts copied into other popular works—openly, and with due acknowledgment, on the part of some authors;—in other cases clandestinely, to deck some Jackdaw of science with the borrowed plumes of an unearned reputation. More important, than either of those two translations, for the promotion of scientific Zoology among English scholars, is that of Siebold's Comparative Anatomy of Invertebrate Animals, by the late Dr. Waldo Burnett, which we have received from the other side of the Atlantic. The publication there of a work so purely scientific, and of which no version has been adventured in England, is but one of many proofs of the deep hold which the Natural Sciences are taking in North America, even side by side with the fierce excitement of gold-winning in some of the newly settled States. A new and enlarged edition of the original work, in German, is also commenced; but the appearance of the volume of Invertebrata, by Siebold,

has been hitherto delayed, while two parts of the Vertebrata, by his coadjutor, Stannius, have come out already. Of another important work, and this a new one, on Zoological structure and classification—"Zoonomic Letters," by Dr. H. Burmeister—the first volume, commencing with the lowest forms of Animal life, has reached us; but this work will require a separate critical notice at our hands hereafter.

Passing from the Zoology to the Botany of the British Islands, we light upon a contribution to Flora which the past year has produced, of especial interest to the student of our native plants. Five years have elapsed since the Third Edition of BABINGTON'S MANUAL OF BRITISH BOTANY appeared: in the *Fourth Edition*, which is now before us, we are again presented with "many additions and corrections," embodying the author's latest views on the limitation of species and varieties, with numerous accessions, from various sources, to the previous list of our native and naturalised plants. As in the former editions, care has been taken to distinguish between those species that are supposed to be truly indigenous and such as have been accidentally introduced and naturalized; and many plants which had been, on insufficient evidence, admitted into the British Flora, are now excluded. The process of reduction might, perhaps, have been carried still further, with advantage.

The whole volume gives evidence of the careful revision and correction which is spoken of in the preface, where we are specially referred to the remodelling of the extensive and difficult groups, *Hieracium*, *Carex*, and the whole order of *Gramineæ*. In reviewing those changes, we cannot but applaud the pains and skill which the author has bestowed on his subject, though, in many cases, we do not acquiesce in his views respecting species. Perfect agreement among naturalists, on the subject of the limitation of species and genera, indeed, is not to be expected, and our own views on this subject happen to differ widely from those adopted by Mr. Babington. To us it appears that the multiplication of species, on trivial grounds, has been carried by modern botanists to an excess, which has materially injured the science, and which, if followed up with equal zeal by the next generation, will go far to reduce Botany to the chaotic state in which it was found by Linnæus. If every form of plant that differs, by some little characteristic, from its fellows, is to be recognised as a distinct species, the process of species-splitting will be endless. Yet this seems to be the rule adopted by a large number of the Botanists of France and Germany. As an evidence of the absurdities to which it leads, we may instance the article *Solanum*, in a recent volume of De Candolle's Prodromus, where the

common *Solanum tuberosum* appears under a score of names; or, to look nearer home, we ask our botanical readers how many of them can distinguish the thirty or forty "species" (so called) into which the common Bramble of our hedges has been divided? We ask, has anything been attained, except confusion, by the labours of modern botanists on the *Rubus fruticosus* of Linnæus? Formerly every botanist knew, or thought he knew, a bramble when he met it; but now scarcely two botanists, we suspect, are fully agreed on the nomenclature of the British species; and, were they to extend their researches to all the countries over which the *Rubus fruticosus* L. and its kindred are dispersed, the difficulty of determination would be greatly increased. Even in comparing the Brambles of Germany with those of England most puzzling difficulties arise, as is evident from the constant changes of name to which the supposed species are liable. But the same difficulty occurs in attempting to collate the British species, as severally understood by Messrs. Leighton, Bellsalter, Lees, and others, who have most attended to the subject; as may be seen by the synonyms collected under almost every species admitted into the Manual. We observe that, in the present edition, two have been struck off the list. We wish that Mr. Babington had carried retrenchment still further. Under his sixth section he observes, "The plants contained in the section are far from being determined satisfactorily;"—a remark which we would venture to extend to the whole six sections. We observe, too, that when a "species" is exploded, its *debris* is frequently parcelled out between several other "species"—not greatly adding thereby, we should think, to their stability. Thus we are told "the plants formerly included under the name of *R. Babingtonii* are now referred respectively to *R. scaber*, *R. pyramidalis*, and *R. fusco-ater* β. *Colemani*." Again: "*R. Wahlbergii* (Bab. not Arrh.) is now placed partly under *R. Corylifolius* and partly under *R. nemorosus*." In our opinion, the fact of such intermediate forms, as these appear to be, occurring between other closely-allied forms, ought to prove to the conviction of any one but an enthusiast the worthlessness of the distinctions which separate those that are still retained.

Among the changes introduced in the present edition we are first struck by the disappearance of *Ranunculus aquatilis*, and the substitution of *six* species—*R. trichophyllus*, *R. Drouetii*, *R. heterophyllus*, *R. Baudotii*, *R. floribundus*, and *R. peltatus*—in its place. We had supposed that the process of hair-splitting had been already sufficiently exercised on the Batrachian Ranunculi; but this large addition to their number shows how much may still be done by ingenuity. Other additions to the British list

are *Polygala austriaca*, found in Yorkshire; *Hypericum anglicum*, a detachment from H. androsæmum; *Epilobium anagallidifolium; Galium montanum*, *G. commutatum*, and *G. elongatum; Salix acutifolia; Orchis incarnata*, separated from O. latifolia; *Epipogium aphyllum*, perhaps the most remarkable addition to our Flora recently discovered; *Arum italicum*, found in the Isle of Wight; and the following Filicoids and Ferns:—*Equisetum Moorei*, "probably not distinct from E. trachyodon;" *Asplenium acutum* (a form of A. adiantum-nigrum); *Pseudathyrium alpestre*, and *P. flexile*, the latter "a doubtful species;" *Gymnogramma leptophylla; Botrychium rutaceum*, and *Ophioglossum lusitanicum*.

The new distribution of the difficult genus, *Hieracium*, demands special notice. In treating of this group the author expresses himself to be under great obligations to the researches of Mr. James Backhouse, jun., who has carefully collected and published most of the British forms. In looking over the list now given, we find that no less than eight of the names admitted into the third edition are omitted, but, as a compensation for this, *fourteen* new names are introduced—leaving a balance of six in favour of the extension of our Flora. Most of the novelties appear under names given by Mr. Backhouse, and are, therefore, regarded by the author not merely as *additions* to the British list, but as absolutely *new* Species. And these fourteen novelties have been discovered on ground which, for the last fifty years, has been more traversed by botanists than almost any other district in Britain. We are not prepared to criticise the characters attributed to all these supposed new species; but the fact of so many new species having all occurred to a single young and ardent observer, in a field so well beaten as that of the English and Scotch Highlands, does not inspire much confidence in their permanence. Every one familiar with *Hieracia* knows that the Alpine kinds especially are subject to infinite variation; and we suspect that it will be more easy for future explorers of the Highlands to discover a dozen other equally distinct types, than to refer, with certainty, the forms that may occur in their rambles, to those now attempted to be defined by Mr. Backhouse. We shall have a repetition of the story of *Rubus fruticosus* and *Solanum tuberosum*. And, supposing the other genera of Compositæ to advance at the same rate, we may soon expect a galaxy of new Dandelions and Cat's-ears. Surely, the varieties of *Leontodon taraxacum*, *Apargia autumnalis*, *Hypochœris radicata*, and other common plants, are as deserving of special description and name as some of the forms now separated from *Hieracium alpinum* and its allies. Most of our common field

and wayside Compositæ might be similarly treated; and *Arctium* already shows, by the addition of *three* new names, what may be done when such common plants as Burdocks are properly investigated and minutely examined. Obviously we do not yet know the riches of our fields.

Various changes have been introduced into the arrangement of the species of several of the large genera; and, evidently, much care has been bestowed on them with a view to render the distribution lucid. *Carex* especially appears to have been very carefully worked over again; but no new species is added in this edition. The most important change occurs in the order *Gramineæ*, which is now divided into two sub-orders, the *Clisantheæ*, distinguished by closed flowers, with long stigmas protruded at the top of the flower; and the *Euryantheæ*, with open flowers and short styles, the stigmas protruded at the bottom of the flower. These groups seem to be natural, and are readily to be recognised by characters simple and easily observed. Some alterations are made in the position of the genera: thus *Nardus* and *Lepturus* are widely separated, the former being placed as the type of a family, *Nardeæ*, in the first sub-order; and the latter referred to *Hordeineæ* in the second. *Arundinaceæ* is combined with *Agrostideæ*, and *Lagurus* from *Aveneæ* added. *Milium* is referred to *Stipaceæ*, and *Knappia* transferred from *Phleineæ* to *Chlorideæ*.

The reductions of species are less numerous than the additions. *Thalictrum majus*, Sm., is reduced to *T. flexuosum*; *Camelina sativa* is expelled, and *C. fœtida* substituted; *Epilobium virgatum* is reduced to E. obscurum; *Saxifraga Andrewsii* is excluded as a garden hybrid; *Helosciadum repens* restored to H. nodiflorum; *Galium pusillum* of E. Bot. changed to *G. sylvestre*, Poll.; *Libanotis* united to Seseli; *Cineraria* to Senecio; *Salix fusca* to S. repens, *S. Forbyana* to S. rubra, and *S. helix* to S. purpurea; *Orchis fusca* is changed to *O. purpurea*; *Phleum commutatum* to *P. alpinum*, and *Festuca sciuroides* to *F. myura*.

On the whole, the present edition bears out the announcement on the title-page, that it contains "many additions and corrections."

A recent discovery in Art, interesting to all Naturalists alike, is the process for obtaining Photographic images in relief; from which electrotype Copperplates can be taken, that yield very clear and delicate impressions. This long-sought-for invention promises to afford multiplied pictures of Natural objects, of complicated form, or intricate pattern, cheaper, at once, and more accurate than Engraving can accomplish.

A. H. H. & W. H. H.

GLAUCUS; or, THE WONDERS OF THE SHORE. By Charles Kingsley, F.S.A., Author of "Westward Ho!" "Hypatia," &c. Third Edition, Corrected and Enlarged. 12mo. Cambridge: Macmullen & Co., 1856. Price 3s. 6d.

WE have already made this little book the subject of a Review (see vol. for 1856, p. 5), but the appearance of a new Edition, *corrected and enlarged*, will, no doubt, be a sufficient apology with our readers for introducing it again to their notice. We know that some people have an objection to new Editions, *with Additions*, and think that the additional matter ought at any rate to be also published in a separate form; but it appears to us perfectly natural that an author should employ his additional knowledge in improving, at each successive edition, any work that he has written, and amplifying it with any fresh ideas to which the previous context may lead him on. Yet the publication of this fresh matter, separately, from that which led to it, would, in most cases, be simply absurd. On a close comparison of this Third Edition with the second we find verbal alterations at pages 23, 48, 74, 97, and 165, and the following additional matter—viz.: pp. 110-117, 118-125, 154-160, 166-168. Some portions of the extracts from Mr. Gosse's works, which appeared in the previous Editions, are omitted in this; thus we get some 24 additional pages, without any increase in the size of the book.

The first verbal alteration occurs in the sentence which created such a stir in the hive; we allude, of course, to the passage in which we were told "our home botanists, *entomologists*, and ornithologists are spending their time now, perforce, in verifying a few obscure species, and bemoaning themselves, like Alexander, that there are no more worlds left to conquer." In the new Edition the word "Entomologists" is here omitted, but we find it transferred to the following sentence:—"For the geologist, indeed, *and the entomologist*, especially in the remoter districts, much remains to be done, but only at a heavy outlay of time, labour, and study; and the dilettante (and it is for dilettanti, like myself, that I principally write), must be content to tread in the tracks of greater men who have preceded him, and accept at second and third hand their foregone conclusions."

This will not do, Mr. Kingsley. You must retouch this sentence for the next Edition, or you will again have the Entomologists down upon you. We boldly affirm that for the Entomologist much remains to be done *without any heavy outlay of time, labour, and study*. Hear Mr. Douglas, in "The World of Insects," p. 4: "It is true a popular writer (the Rev.

C. Kingsley, in "Glaucus," 1855) has lately said that the field of Entomology in Britain is fully explored; but I beg to assure him and his readers that such is not the case, for the chances are that, out of fifty persons who should this year begin to collect insects, twenty-five would each discover either a new British species, or a new fact in insect economy." Mr. Kingsley and Mr. Douglas on this subject are evidently at variance; they cannot both be right, and though we have a great respect for Mr. Kingsley, we are disposed, on a question of Entomology, to repose more confidence in the assertions of the author of that capital book, "The World of Insects." The additional matter at pp. 110-117 relates to seaweeds and marine plants. Take as a sample the following, at p. 116 :—

"Not merely interesting, too, but brilliant in their vegetation, are sandhills; and the seemingly desolate dykes and banks of salt marshes will yield many a curious plant, which you may neglect if you will; but lay to your account the having to repent your neglect hereafter, when, finding out too late what a pleasant study botany is, you search in vain for curious forms over which you trod every day in crossing flats, which seemed to you utterly ugly and uninteresting, but which the good God was watching as carefully as He did the pleasant hills inland—perhaps even more carefully; for the uplands He has completed and handed over to man, that he may dress and keep them; but the tide-flats below are still unfinished; dry land in the process of creation, to which every tide is adding the elements of fertility, which shall grow food, perhaps in some future state of our planet, for generations yet unborn."

At pp. 118-125, we have allusion to various dredging grounds, and much specially about Hastings, of which Mr. Kingsley says—"As the place is so much visited by Londoners, it may be worth while to give a few hints as to what might be done by any one whose curiosity has been excited by the salt water tanks of the Zoological Gardens." So by all means let the reader, if he is going to Hastings, put a "Glaucus, 3rd Edition," in his carpet-bag.

In our previous notice we observed, "It may well be doubted whether any previous book has appeared for years past which has done more to promote the study of Natural History than the little book we have now under consideration will certainly do," and entertaining this opinion, we are pleased to perceive that the demand for this book is so great that already more than 5,000 copies are in circulation. We notice the 3rd Edition is advertised at the "6th Thousand." A work that in eighteen months has attained such a circulation stands a fair chance of eventually attaining its "Twentieth Thousand." We trust that Mr. Kingsley, accordingly, will gather together, from Naturalists of all classes, any hints—and surely they owe him every contribution in their power—that might possibly assist him for the "Fourth Edition."

GEOGRAPHIE BOTANIQUE RAISONEE OU EXPOSITION DES FAITS PRINCIPAUX ET DES LOIS CONCERNANT LA DISTRIBUTION GEOGRAPHIQUE DES PLANTES DE L'EPOQUE ACTUELLE. Par M. Alphonse De Candolle. 2 Vols. Paris. 1855.

THE illustrious name of De Candolle has long stood among the first in the first rank of philosophical botanists. The elder De Candolle, father of our present author, and universally known to every working botanist through the indispensable "*Prodromus*," contributed upwards of 140 treatises to botanical science, many of them works of considerable extent, and all of them marked with abundant proofs of the original research and ability of the writer. The publication of these works extended over a space of forty-four years—a long and glorious career of mental activity. They include essays or treatises on every department of Botany—the structural, physiological, systematic, economic, and geographical—and have deservedly acquired for their author a fame imperishable, while Botany shall exist as a science. It is no light matter to inherit the name of such a father. It is no easy task for a son, standing at the base of such a pyramid, to prove himself equal to his position; and we cannot speak in higher praise of M. Alphonse de Candolle than by saying that he has proved himself not unworthy of such parentage. His works, indeed, have been few and restricted in subject, in comparison to those put forth by his father; but they are sufficient to prove his ability as a botanist, and to establish the fame of any ordinary person.

The work now before us is, perhaps, his most important contribution to Botanical science, and is obviously the fruit of many years' thoughtful study and laborious research. It treats in detail, and at great length, of the general and particular relations of plants to climate and soil, and their dispersion over continents and islands. The subject is divided into twenty-six chapters, grouped under four books, and fills 1334 closely printed octavo pages. We can only attempt to give a very brief account of an essay which branches out into innumerable subjects, the discussion of any one of which would be sufficient for an article.

The first book discusses with some detail, but in a general way, the effects of temperature, light, and humidity on the development of vegetation. The author commences by exposing the false views popularly entertained with respect to the relationship between plants and the climate in which they live. Many persons suppose that the presence or absence of such-and-such forms of vegetation is a certain indication of a precise cli-

mate, as if each plant individually were a sort of natural thermometer. This incorrect notion has been perhaps chiefly mischievous in reference to the obscure regions of fossil Botany, where certain climates have been hastily assumed to have existed in certain localities at a former epoch because certain forms are found fossilized in the strata. Thus, because *Zamias* are now found at the Cape of Good Hope, in New Holland, and in the table-land of Mexico; and because fossils of kindred structure are embedded in the strata of England, and of other northern countries, it has been assumed that the England of the Zamian era must have had a similarly hot and dry climate to that of South Africa, or of Western Australia, where these forms of vegetation are now common. The inference is, however, a very vague one, resting on a very narrow basis, as will be evident when we examine a little more carefully the climates where the Cycadeæ are now found. We shall then discover that though none inhabit a very cold country, yet the range of climate, especially as regards humidity, over which the Order is distributed is very extensive, some species growing in the moist jungles of tropical India, others in the low islands of the Pacific archipelagos, besides those more familiar forms which we have from the arid regions of the Cape and Australia. It would be impossible to tell from the mere inspection of a modern Cycadeous stem and foliage whether they had grown in a tropical or extra-tropical climate; and it must be just as hazardous to pronounce on the nature of the climate which nourished Cycadeæ in the earlier eras of our planet. It would be as reasonable to judge from the finding of fossil *acorns* or *oak logs* that such indicated a climate in the regions where they occurred similar to that of modern England, of which the oak may be taken as a characteristic tree. But in this hasty assumption we should lose sight of the fact that the genus *Quercus* has a wide distribution in tropical as well as in temperate and cold latitudes, species being found from very high latitudes on the American continent nearly to the equator, and occurring on the mountains and table-lands of tropical India, and of the island of Java. Were the species of oak now existing in Java fossilized there, leaving no descendants, some future geologist, knowing the oak only as a form of vegetation of cold or temperate regions, might draw, from its presence in the strata of Java, a very false inference respecting the early climate of that tropical island.

That a plant does not indicate a particular climate in a manner analogous to a thermometer or hygrometer must be evident to any one at all acquainted with the powers of endurance which certain species display, and the feebleness of endurance equally obvious in other species; so that each

species of plant has in some degree its own *charter*, one enjoying more extensive privileges than another. Nor, until we have ascertained the facts regarding species by particular observations, can we with certainty foretell what will be the effect of change of climate upon them. What would be more natural to suppose than that all the plants spontaneous at the Cape of Good Hope, supposing they occurred at a tolerably uniform elevation above the sea, would be influenced by change of climate in a like degree? Their native climate is a very remarkable one—remarkable for the intensity and amount of solar light throughout the year; for rapid changes of temperature, and for the very unequal distribution of moisture at different seasons. We should expect among them a common *feeling*—so to say—on their removal to this country; and such, to a certain extent, is the case. But the exceptions are very numerous; for while some—such as the Heaths and Pelargoniums—flourish and actually improve in the artificial climates of our green-houses, others—as many of the bulbs—are with difficulty induced to blossom, and rapidly degenerate.

As might be expected, most Cape plants require the protection of glass in winter; but to this there are many remarkable exceptions. The *Agapanthus* flowers freely in the south of Ireland, in the open ground, from year to year; and the *Tritomanthe* (hot-poker plant) is even still more hardy; for we have seen it raising its spike of scarlet flowers uninjured from among the snow. Yet this plant is a native, not of high mountains or table-lands, but of the low plains at the Cape, where the thermometer may stand on a summer day in the ground, close to its roots, at a height of 130° to 160°. When we find such wide discrepancies as these among plants of the same region, we may well agree with our author in maintaining that the question of the relation of plants to climate is a very complicated one; and that we can only rightly understand it by regarding plants as "living machines," having a certain work to do, and struggling to perform it at all hazards, fighting under difficulties against physical agencies. Beyond a minimum of light, heat, and moisture, life ceases. With fair proportions of these (according to the wants of each individual species) it is maintained with vigour; and there are a thousand intermediate stages of excess or deficiency in which a struggle for existence is by the more hardy species maintained.

After discussing the effects of light, heat, and moisture in general, M. de Candolle divides his subject into two principal sections, which he distinguishes by the names Geographic Botany and Botanical Geography. By the first of these he understands the consideration of species, genera, and

families of plants in a geographic point of view; and by the latter, the consideration of different regions of the earth with respect to the vegetation which clothes them. The first division, or Geographic Botany, offers the widest field of research, and forms, indeed, the bulk of the treatise, occupying sixteen of the chapters, and filling nearly 1100 pages. We can only briefly allude to a few of the subjects treated of. The first chapter, a very important one, runs over 300 pages, and discusses, under the varied circumstances which influence the dispersion of plants, their limitation on the plains and on the mountains. The limits occupied by spontaneous plants on the plain, or at a moderate level above the sea, in a direction towards the pole, and towards the equator, are illustrated by detailed accounts of certain well-known annual, perennial, and ligneous species. Each of the indicated limits is then separately discussed, and this is followed by general considerations on the polar and equatorial limitation of each description of vegetable. We have then the limits in altitude of spontaneous plants similarly treated; and, finally, cultivated plants, whether on mountain or plain, are subjected to a like analytical examination.

The next chapter discusses what the author calls the "*form*" of the habitat of species—namely, the differences in the diameters of the area occupied by different species, when the line is drawn east and west, or north and south, or in some intermediate directions. Some curious facts are noted on this subject, and obviously this chapter deserves to be more extensively worked out. The author has limited his observations to the species contained in the eighth, ninth, and tenth volumes of the "Prodromus," as offering sufficient illustration of his subject, and finds that of the 8,495 species contained in those three volumes, there are only 116 which present any very marked differences (four times at least) between the lengths of the opposite diameters of their areas. The remaining 8,372 species appear to occupy more or less circular areas—a remarkable fact. It must be observed, however, that this examination refers exclusively to certain orders of the *Corolliflorœ*, whose distribution can hardly be taken as fairly representative of that of Phanerogamous plants in general. Of the 116 species selected by M. de Candolle, sixty-eight extend east and west, and forty-eight in a narrow line north and south. One should hardly have *a priori* anticipated so nearly equal a division of the number, it seems so much more natural that a species should extend along the parallels of latitude, or, at least, in the isothermal lines, than along those of longitude. We are thus taught that other causes than those of annual temperature powerfully influence the natural dispersion of plants. The most potent, probably, are

moisture, and exposure to certain winds. Of the forty-eight species enumerated as having a north and south distribution, only *two* are natives of Britain, namely, *Pinguicula lusitanica*, which extends along the Atlantic shores from Portugal to the north of Scotland, but which is not found anywhere far from a western coast; and *Erythræa latifolia*, likewise a coast species, found from Norway to Portugal.

The distribution of individuals in the areas occupied by the species is next discussed, with considerable detail, showing how local causes modify the frequency or non-frequency, or the luxuriant development, of each species. The nature of the soil, exposure, supply of moisture, and other obvious modifying causes are indicated, and a list is given, after Mohl, of species which are characteristic of primitive rocks, and of those which only occur in calcareous soil. M. de Candolle seems to think also that something like a "rotation of crops" exists naturally among wild plants, and that a species shifts its soil (especially an annual one) from year to year, from causes similar to those that force the farmer to vary his seeds when cultivating the same soil. "One cannot doubt," he says, "that the existence of a species, and especially its prolonged existence, becomes a cause unfavourable to the life of that same species, or of analogous species, in the same soil." The well-known fact that when a natural forest is burned or cut down, trees of different species commonly spring up in the room of those destroyed is adduced in proof of the necessity of rotation; and the hypothesis of the elder De Candolle, that roots discharge excretory matter, so as to poison the soil for themselves, is dwelt upon as an established fact.

The seventh chapter treats of the area or space on the surface of the globe over which a species extends. This important subject has for a long time engaged the author's attention, and the result now given must have cost years of toilsome research. The value of this research must, however, in great measure depend on the author's views as to the limits of the species themselves. In the hands of some writers who establish "new species" on every local race, if it differ by a hair's breadth from their "typical" form, a chapter like the present would only lead to confusion. Fortunately for science, M. Alphonse de Candolle is content to call "*Ranunculus aquatilis*" by its single name, and consequently finds it to extend over the northern hemisphere, from Lapland to Abyssinia, and from the 68° parallel of north lat. in America to California. Had he chosen the opposite course, he might easily have treated us to a crowd of "representative species," each peculiar to its own pond or ditch, over the same extent of surface.

For purposes of comparison the world is divided into fifty "regions," each supposed to indicate a more or less marked flora, and defined by strongly marked geographical limits and climatal peculiarities. Thus, there is a well-marked arctic region comprised within the polar circle, and common to Europe, Asia, and America. Many of the species characteristic of this region appear again on the limits of perpetual snow in more southern climates, and yet the alpine flora, taken as a whole, is very distinct from the arctic. Europe, minus its arctic portion, is divided into two well marked regions, the temperate or Northern and Midland States, and the Mediterranean, including the shores of that sea, as well as the whole Iberian peninsula. Some of the detached Atlantic Islands, such as St. Helena (with Ascension), and the minute Tristan D'Acunha, are distinguished as separate regions, and apparently with justice, so very peculiar is their flora, especially of the former. Such minute specific centres contrast strongly with our author's 29th region, which comprises the Australian continent, with its outliers, Tasmania, New Zealand, Norfolk Island, and New Caledonia. North America, east of the Rocky Mountains, and as far south as the mouths of the Mississippi, forms another extensive, but well marked region. Brazil is divided into three regions, and the remaining portion of S. America into ten; so varied is that continent, in different parallels, in its vegetable productions. The author does not lay much stress on the exactitude with which his regions represent natural limits; indeed, he states that his arrangement is defective on several points, but having commenced to tabulate on this basis it was necessary to go on with it. Tables are given illustrating the area occupied by species and families. From these it appears that the comparatively small family of *Papaveraceæ* includes some of the most widely dispersed plants, one of its species *(Argemone mexicana)* occurring in eleven regions, while Myrtaceæ, a very extensive order, is specifically very local, only three out of its 700 species occurring in three regions. Of Papaveraceæ, 68 per cent., Cruciferæ, 75 per cent., Campanulaceæ, 89 per cent., and Myrtaceæ, 97 per cent. consist of species limited to a single region. Next follow tables contrasting the floras of different countries, the first table, illustrating that of New Holland, being copied from Mr. Brown, who states, that out of 3,760 flowering plants known (in 1814) as natives of Australia, 45 are common to Europe. Since that date the number of Australian species has been doubled, but not many more European species have been detected. Perhaps one of the most remarkable discoveries of late years has been that of *Lysimachia vulgaris*, found by Dr. F. Mueller in the alpine region of Victoria, far removed from

any settlement. Of course, the progress of colonization has introduced a vast number of European weeds, some of which, especially the thistles, bid fair soon to supplant weeds of natural growth, and in a few years the local botanist will be puzzled as to the claims of many plants, whether indigenous or naturalized. The flora of New Zealand contrasts remarkably with that of the larger island, for out of the 730 flowering plants described by Dr. Hooker, 223 are common to other countries, and 60 are common to Europe. Of the 113 species found at Norfolk Island, 61 are peculiar to that island, 52 common to other countries, and 8 also natives of Europe. The little island of Tristan Da Cunha, so well explored by the late Captain Carmichael, contains 32 species of flowering plants, 26 of which are found nowhere else.

We have next tables to show the proportion, by families, of species common to widely separated countries. The facts are similar to those just stated, but given more in detail, and illustrated by more numerous examples. Then follow tables showing the proportion, by families, of species dispersed over more than two regions, and the mean area of species considered in reference to the nature of their habitats, whether aquatic, moist, or dry; relative to their duration, whether annual, biennial, perennial, &c.; their degree of lignification, whether trees, shrubs, or suffrutices; and lastly, relative to the nature of their seeds, whether the fruit or seed be winged or fleshy, whether the seeds be numerous or few, small or of large size, soon perishable or capable of long existence in a dormant state. It is impossible in this hasty sketch to do justice to the care with which these and other details are worked out. We can only mention a few of the results. With respect to habitat, it appears that 17 per cent. of submerged or floating flowering plants are common to more than two regions, 9 per cent. of marsh plants, 7 per cent. of the plants of wet ground (not strictly marshes), 10 per cent. of maritime plants, and 7-10 per cent. of parasitical plants. Out of 389 purely parasitic plants noticed, only *three* are found in more than two regions. The half parasites, such as *Orobanche*, *Monotropa*, and *Cuscuta* are more dispersed, 8 per cent. being found in more than two regions. Of families chiefly consisting of annual species, 7 per cent. occur in more than two regions; of perennial herbaceous families, 5 per cent.; and of those composed of trees and shrubs, less than 2 per cent. A considerable number of arborescent plants are limited to one or two regions; out of 2,321 species enumerated, only 43 exceeding those limits. Out of 292 coniferous trees, 12 are widely dispersed, a large per centage when compared with most other ligneous families. One would

have supposed that *winged* seeds were favourable to the dispersion of species, but M. de Candolle's tables show a different result. In almost every family enumerated, the per centage is in favour of naked or wingless seeds, remarkably so in *Dipsaceæ*, where 11 per cent. of species with calvous seeds are widely dispersed, while only 3 per cent. of those furnished with pappus enjoy as wide a range. Among the Compositæ the proportions are as 4·5 to 2·9 per cent. in favour of calvous seeds, by which it should follow that daisies were twice as diffusable as thistles or dandelion.

A list is given of 117 species, which occupy very large areas, "at least a third part of the surface of the globe." Out of these, 100 are natives of Britain. Many of them extend over much more than the third part of the earth's surface, but none appear to compass the whole earth, however wide their extent. "The *Stellaria media* (chickweed), for example, which endures very severe climates, and easily becomes naturalized in temperate regions, is found neither at Melville Island, nor in Labrador, nor under the Equator." "Nettles themselves, which one looks upon as accompanying man, do not support, like him, the extremes of cold and heat; they are wanting in Labrador, Melville Island, as well as on the plains of the torrid zone. The *Portulaca oleracea*, *Sonchus*, *Lamium amplexicaule*, *Chenopodum album*, *Cynodon Dactylon*—plants that may be looked on as universally diffused, so common are they, and so easily naturalized—do not penetrate into the extreme northern climates. One alone, the *Sonchus oleraceus*, is, perhaps, so organised as to endure all climates, from the equator to the pole; but it needs a cultivated soil or rubbish; and such stations are wanting, and always will be so toward the extreme north. Thus, I repeat, no phanerogamous plant is or can become a *cosmopolite* in the absolute sense." The number found to occupy half the globe is extremely limited, only 18 being enumerated out of the 117 first named. Many of the most widely dispersed are either purely aquatic or frequent very moist situations; 14 or 15 species are natives of very dry places, and from 25 to 30 are chiefly found in cultivated ground. Many littoral species, which would have found a place in the lists, if the calculations had been based on parallels of latitude or longitude, are excluded, because, though widely dispersed geographically, they extend too short a distance from the shore to form large *areas* of distribution. No tree or shrub figures in the list. The *Thymus serpyllum* is the most ligneous plant, if we can call it an "undershrub." Of the species enumerated 47 are annuals, 3 biennials, and 66 perennials; 73 are dicotyledons, and 44 monocotyledons—that is, in the proportion of 62 per cent. dicotyledons to 38 per cent. monocotyledons.

And as the proportions of these classes in the vegetable kingdom are as 83 to 17 per 100 species, the facts stated confirm the greater mean area of monocotyledons over dicotyledons.

A much shorter list is given of species having a very limited area, not because such plants are less numerous—for the contrary is unquestionably the fact—but because it is difficult to ascertain the exact limits occupied by such species, except when they occur in very remote islands, or in countries thoroughly explored by botanists. The island of St. Helena contains several species, and even arborescent *genera* (of *Compositæ*), which are not only found nowhere else, but which are confined to very small areas on the island. The noble tree-fern, *Dicksonia arborescens*, occurs only on the summit of Diana's Peak, the crown of the island. Kerguelin's Land is the only known habitat for the genus Pringlea (Capt. Cook's cabbage); the Auckland Islands, Tristan Da Cunha, Juan Fernandez, Madeira, and other small islands, all contain species or genera peculiar to themselves. The famous Cocos de Mer, or Double Cocoa nut *(Lodoicea sechellarum)*, a most remarkable and distinct genus of Palms, is only found at the rocky islets of the Sechelles, and only inhabits a few of the group. In like manner, each of the Canary Islands has species peculiar to itself; and this is still more remarkable at the Gallapagos, of which group Dr. Hooker has published an excellent flora (in the 20th vol. of Linn. Trans.). But limited dispersion of species is not confined to remote islets. It occurs in continents. Several instances of extremely small areas of well marked species occurring in Europe are given by M. de Candolle. To these we may add a few exotic examples:—*Dionœa muscipula*, certainly a very remarkable plant, not likely to escape the notice of American botanists, is limited to a very small area in North Carolina (where it abounds), and a single station in South Carolina. In like manner, the curious *Cephalotus follicularis*, the Australian Pitcher Plant, which abounds in all the bogs round King George's Sound, has been found nowhere else. The species, too, of *Nepenthes* appear to be very local, each tropical island in the area occupied by the genus having its peculiar kind. *Disa grandiflora*, the most showy of terrestrial Orchideæ, having a flower sometimes five inches in breadth, with crimson petals, is only known on the borders of a little streamlet on the summit of Table Mountain, at the Cape; but along that streamlet the plant is abundant. But many Orchideæ, we suspect, have a very limited extension. It is well known that the Cape flora is peculiarly rich in species of *Erica*, upwards of 300 having been described. Several of these are extremely local, while others are found scattered over many

hundreds of square miles, from the western districts to Port Natal. The same may be said of many of the Proteaceæ, both of the Cape and of Australia. Every district, of no great extent, supplies its own peculiar species. Even some genera, such as *Franklandia* and *Bellendena*, are confined to very small areas. *Clianthus puniceus*, so well known in our gardens, is much more likely to be preserved in cultivation than in New Zealand, its native country, where its range is very limited.

The causes operating on the natural extension of species are summed up under three heads, namely:—transportation, more or less easy, or more or less frequent, of seeds in a germinating state, such transportation being effected either by currents, or incidentally through the agency of animals or man; connection or separation more or less real of countries having more or less analogous climates; and lastly (and, as we believe, *chiefly*), the physiological peculiarities of each individual species. Besides these actually existing causes, others may have formerly operated; for example, there may have been different means of transport at another geological epoch; islands now widely separated from continents may have formerly been connected; some species, very widely dispersed, may have an earlier date in creation than others; or the original number of individuals of different species may have been different; for we need not necessarily suppose, in the vegetable kingdom at least, that every species spring from one or two individuals.

The changes which take place in the habitats of species form the subject of the eighth chapter. The question of naturalization* is largely discussed, and copious lists are given of species naturalized at short or at long distances from their native localities. Some of these species, now widely dispersed, are of recent introduction. *Mimulus luteus*, introduced from North America to our gardens so lately as 1812, has been found "apparently wild" in many parts of the Highlands of Scotland. We have also seen it in the Wicklow mountains; and M. de Candolle states that it has spread along the streams in many valleys of the Vosges. Its American habitat is extensive, reaching from Unalaschka, on the north, to Chili. *Œnothera biennis* (the "evening primrose"), a native of North America, introduced 1619, has become so disseminated over the greater part of

* At p. 714, the author makes a strange blunder in confounding *Stratiotes aloides, L.*, with *Pistia stratiotes, L.* Which of these plants is naturalized in the tanks at Marly, we cannot say; but it is *Pistia stratiotes*—not "Stratiotes aloides," as stated—which is a native of the Molluccas, Java, Malabar, and other intra-tropical countries. *Stratiotes aloides*, we need hardly say, is a well-known European plant, and a native of England.

Europe, that some modern botanists have questioned its exotic origin. It is equally common, in the neighbourhood of cultivation, in South Africa, and is spreading in Australia.

The recent appearance of *Anacharis alsinastrum* in English canals and rivers is a remarkable instance of the rapid dissemination of mischievous exotics. These and several other plants—some of them troublesome weeds—Europe owes to America; but she has more than returned the gift in the number of species she has transmitted, and the extent of surface they cover. Whoever has travelled through the United States must have been struck with familiar road-side, hedge, and field-weeds, reminding him of home. Two species of mullein (*Verbascum Thapsus* and *V. blattaria*) are specially common by roadsides, and in recent clearings and along the borders of railway cuttings, as if their seeds were widely and abundantly dispersed in the soil; yet they are unquestionably introduced from Europe. The *Leucanthemum vulgare* (ox-eyed daisy) is a far more troublesome weed in America, its adopted home, than it is in Europe; and so of many other European weeds, now rapidly extending with cultivation over the whole surface of North America. In Australia there is no native species of thistle; but European thistles have become such pests, even in the recently settled colony of Victoria, that the legislature has been obliged to pass an Act, enforcing penalties on the farmer who shall not duly eradicate the thistles on his ground. In Tasmania, the sweet briar (*Rosa rubiginosa*), though but a few years ago introduced to gardens as a memento of home, has become wild, and in some districts already forms dense thickets which extend rapidly year by year, the innumerable *hips* being dispersed by birds. In many places already it must be regarded as a pernicious weed. *Ulex europæus* (the furze-bush) has likewise escaped in Tasmania, and, as on the highlands of St. Helena, flourishes abundantly. *Anthemis nobilis* is also completely naturalized, and in some places we have seen whole fields occupied with it, almost to the exclusion of other herbage.

To the chapter on naturalizations succeeds a history of cultivated plants, tracing the origin of the species most notably cultivated for their roots, tubers, bulbs, stems, leaves, flowers, fruits, or seeds. At the head of the list stands the Potato *(Solanum tuberosum)*, which is stated to have been found in cultivation, at the time of the discovery of America, "in all temperate regions from Chili to New Grenada, but not in Mexico." *(Humb.)* The fact of its having been also cultivated by the aborigines of North Carolina, from which place its roots were brought by Raleigh, is questioned, and we think justly so, the authorities in support of the story being few

and vague; while the evidence against its cultivation by the aborigines appears strong, if not conclusive. If Raleigh found potatoes in North Carolina, they were probably transposed thither by the Spaniards. The potato has not been found wild in any part of the United States, nor was it known to any of the aboriginal tribes before the settlement of Europeans. Such is the joint opinion of Professor Asa Gray, the most competent botanist of America, and of Dr. Harris, Librarian of Havard University, an equally competent authority in questions affecting the early history of America. The Manioc, Manihot, or Tapioca Root *(Jatropa Manihot)*, so important an article of food in the West Indies, is referred to, having been found extensively cultivated at the time of the discovery. It had been erroneously stated by the Abbe Raynal to have been introduced from Africa; but modern botanists have shown that the genus abounds in species in tropical America, while none have been found *wild* in tropical Africa, a circumstance obviously in favour of the American origin of the cultivated kind. Species of *Dioscorea* or Yam, wild and in cultivation, are found throughout the tropics of both hemispheres, rendering it difficult at the present time to determine what may have been the origin of the cultivated kinds. Notwithstanding their extensive cultivation in India, they have no Sanscrit name. It is disputed whether the name *Yam* or *Igname* be of African or of American origin. On the whole, the author refers the probable original centre of Yam-cultivation to the Indian Archipelago and the Southern extremities of Continental Asia. The native country of our common Jerusalem Artichoke (*Helianthus tuberosus*) is unknown; the species is nowhere found in a wild state. It has been known in European gardens from the beginning of the seventeenth century, and Columna, who saw it, in 1616, in the gardens of Cardinal Farnese, names it *Aster peruanus tuberosus.* Parkinson calls it *Batatas canadensis;* Bauhin, *Chrysanthemum latifolium brazilianum.* All these names seem to betray an American origin, and De Candolle fixes on the temperate parts of Peru as being the most probable native soil. *Hemp* and *Flax*, the earliest cultivated of textile materials, are both referred to the temperate parts of Asia, in the Caucasus, and towards the borders of the Caspian Sea. Hemp is still found wild in Northern India, and Flax in certain districts of Russia; but it must be extremely difficult to discriminate between the wild and naturalized condition of plants of such early and extensive cultivation. The *Sugar Cane* is a native of tropical Asia, cultivated from very early times in China, but not anywhere found in a state of nature. It was introduced from Arabia, in the Middle Ages, into Egypt, and thence into Sicily and the South of

Spain. It was transported into the Canary Islands in 1503, and soon afterwards found its way to the West Indies and Brazil. Of plants cultivated for fruits (we omit tropical fruits) the several varieties of the Orange and Lemon are traced to the warmer parts of Asia; the Vine, to the Caucasian region, where it is still found wild; the Strawberry, Raspberry, Cherry, and the many varieties of Plums are from temperate Europe and Asia; the Apricot from Armenia and the Caucasian region generally; and so also the Almond. Peaches first made their appearance in Europe a little before the commencement of the Christian era, and their name, *Persica*, or *Malum persicum*, indicates their Eastern origin. They have, however, no Sanscrit name, and M. de Candolle supposes that they were originally brought from China. At present the Peach tree exists, apparently wild, in many parts of Asia: Koch affirms that it is abundant in the Caucasian provinces, but Ledebour doubts if it be spontaneous there. Pears and Apples are of European or Caucasian origin; the Quince is wild in the South of Europe; the Pomegranate, to which Northern Africa is often assigned, is traced to Western Asia. The various Gourds, Melons, the Water Melon, and the Cucumber, all of which are now only known in cultivation, are traced to the East, whence they were introduced, at various periods, into Europe. Currants and Gooseberries are from temperate Europe. The Fig and the Olive, from early times naturalized throughout the Mediterranean region, are supposed to have been primarily derived from Asia Minor, or from that Caucasian district, the cradle of the human race, so abundantly supplied with the best gifts of the earth. The origin of the various species of grain, and of seeds used for other besides edible purposes, is discussed at length. The history of many of the best known is lost in antiquity. If they ever existed in a state of nature, they have long since ceased to exist. The probability is that many of the so-called species of cultivation are races which have originated under man's care and skill, and which depend on his exertions for their continuance. If the experiments of a modern observer are to be depended on, wheat itself is a cultivated monstrosity of a miserable grass (*Ægilops*) of the South of Europe, which is so different in its botanical structure from cultivated wheat that it has been always supposed to be *generically* distinct. If such transformations are possible, others, equally startling, may have occurred.

The subject of *disjoined* species, or those that are found scattered at wide intervals, without any apparent physical connection between the several localities where they occur, is next discussed at large. The origin of existing *spontaneous* species is then speculated upon; the geographic dis-

tribution of genera and of families is illustrated, and this division of the subject concludes with some general remarks on the changes which take place in the habitats of families, and the origin and derivation of these groups. Our limits do not permit us to enter into these subjects, which occupy ten chapters of the Essay.

Nor can we do more than indicate the subjects contained in the remaining portion, called by the author Botanic Geography, in distinction to Geographic Botany. Seven chapters are devoted to this section, which comprises the following items:—General Characters of Vegetation; Comparisons between different countries with respect to the proportion of Dicotyledons to Monocotyledons, and a comparison with respect to the families most numerous in species, and to the families most characteristic of the country. Then follows a chapter on the variety of vegetable forms in different countries and in the entire globe; the division of the surface of the globe into natural botanical regions; and lastly, the vegetation of different countries is considered in regard to the probable origin of their species, genera, and families. In this last chapter the ingenious views of Edward Forbes in relation to the origin of the *Mediterranean* species, which occur so abundantly in the West of Ireland, are favourably noticed.

We must now conclude our hasty sketch, warmly recommending these volumes to the careful study of all persons interested in the subjects of which they treat. From the imperfect abstract we have given it will be evident that the questions of the climatical relations of plants are treated with great minuteness, with much learning and research, and the material ably and laboriously worked up. It is a work which will at once take rank as a text-book, to be referred to, not as a complete essay, exhausting the subject, but as a storehouse of information, uniting within a moderate compass most of the observations yet recorded, and serving, therefore, as a stable basis for further research. The subject of Botanic Geography, so far from being exhausted, is only yet in its infancy, and no doubt many of its facts will be read differently hereafter; but we think that the principles stated and advocated in the present treatise will, as a whole, stand the test of time.

W. H. H.

"Cours elementaire D'Histoire Naturelle, Zoologie par M. Milne Edwards, ouvrage adopte par le conseil de l'instruction publique, etc. Septieme Edition avec 473 Figures." Paris. 1855.

A Manual of Zoology, by M. Milne Edwards, Member of the "Institut," adopted by the Council of Public Instruction of France. Translated by R. Knox, M.D., F.R.S.E., Lecturer on Anatomy, and Corresponding Member of the Imperial Academy of Medicine. Illustrated by 500 First-class Wood Engravings. London. 1856.

There are three works which, taken together, form the elementary course of Natural History prescribed by the Council of Public Instruction in France:—one on Botany, by the grandson of the celebrated Jussieu; one on Mineralogy and Geology, by Mons. Beudant; and one on Zoology, by M. Milne Edwards. We purpose directing the attention of our readers to the last mentioned work, and to a translation of it by Dr. Knox, which has recently been published.

The "Zoologie," in its original form, has already passed through seven editions; and a letter from its learned author, addressed to Dr. Knox, states that above 30,000 copies have been sold. A sale so large as this is no bad criterion of the merits of the book. By it the public has testified its approval in the most unequivocal manner, and rendered eulogium on the part of a reviewer unnecessary.

The first edition appeared in 1841. It had 572 pages, with 451 figures. The seventh edition was published in 1855, containing 584 pages, and 473 figures. In point of size, and in regard to the number of illustrations, the two editions are much alike, the principal difference consisting in some additional figures, and a few pages of letter-press added to that part of the book which treats of the *Mammalia*. We cannot but wish that a similar addition had been made to the portion devoted to the other extremity of the animal scale. The information there given is very scanty. Nine pages—and only nine—are occupied with one of the four great groups into which the animal world is divided—that to which M. Edwards gives the name "Zoophytes." Under this term he includes the *Echinodermata*, *Acalepha*, *Polypes*, *Polygastric Infusoria*, and *Sponges*. Yet within this humble group occur some of the most interesting phenomena which modern research has revealed, and others as yet but imperfectly seen, wherein the Naturalist has caught glimpses of a truth which he has been unable to seize. No one can be more fully aware of this than M. Edwards himself. Occupying the eminent position he does, and having access to the best sources of information, he must needs know what continental naturalists have been doing, and to

what extent their fellow-labourers in these kingdoms have aided in the onward progress of science. We must conclude, therefore, that M. Edwards has some good and sufficient reason for not treating more at length of those lower tribes; and we can think of none so probable as an unwillingness to make much change in a book of which so many copies are in circulation. In all schools and colleges, inconvenience is felt both by teachers and students from discrepancies and differences in successive editions of the same work. To avoid causing such annoyance, M. Edwards possibly has allowed this part of the work to occupy now no greater space than it did fourteen years ago, when the lower invetebrate animals were comparatively but little regarded.

It must not, however, be supposed that all evidence of progress has been suppressed. In some instances it has been indicated, though not fully displayed, as, for example, the connection between the Medusæ and the Sertularian zoophytes, opening up the debateable subject of the "alternation of generations." This receives an illustration from the *Biphora*, marine animals whose singular changes warrant the appellation happily bestowed upon them, when M. Edwards tells us "ces animaux bizarres sont assez communs dans la Méditerranée." The affinity between the Polyzoa and the tunicated molluscs is distinctly expressed, and both are grouped together under the common term "MOLLUSCOIDES."

There are, however, cases in which statements, now known to be erroneous, continue to be given, without even a foot-note to warn the reader of the changes in opinion which are consequent upon the advance of zoological knowledge. Thus, at page 569, we read of coral islands which appear to be based on the craters of extinct volcanoes. Yet Darwin had completed his voyage in the Beagle in 1836; he had communicated his observations on coral islands, and the true theory of their formation, to the Geological Society of London, in 1837; and Sir Charles Lyell, in his "Principles of Geology," seventh edition, published in 1840, had renounced the old hypothesis, adopting the satisfactory and philosophical explanation of Darwin. The first edition, therefore, of the "Cours Elémentaire" contained on this point the idea still current, but even then known to be erroneous, and this statement remains unchanged.

We may adduce another example in corroboration of our remark. The figure of the Argonaut appears with the expanded sails, and the "tiers of oars on either side," according to poetic fable; yet no information is given regarding the habits of the animal, and the important functions performed by the supposed sails; and a doubt continues to be implied, if not expressed,

as to the true builder and owner of the graceful shell (p. 553), years after all question on the matter has been set at rest by positive observation and experiment.

While we think it right not to pass by unnoticed the omissions or defects of this excellent manual, we most cordially concede to M. Milne Edwards the rare honour of both advancing zoological knowledge by original research, and diffusing it by the production of an elementary work, which has been welcomed wherever it has appeared. In these countries it is well known to every naturalist, and its beautiful illustrations, by means of casts and electrotypes, supplied by the publisher, have been multiplied, and served as illustrations for other works of a similar kind.

We are tempted to pause as we pass along, and meditate on the good that this small volume may be expected to accomplish. It is widely spread over France; it has sailed along the Mediterranean, steamed on the Rhine, climbed the Pyrenees, and nestled in quiet valleys amid the Alps. In every place it has, doubtless, found some ardent inquirer, whose views have been rendered clearer, and whose progress has been aided by the lore gleaned from its pages. Who can venture to estimate the impetus given to the onward march of Zoology by the ardour of youthful recruits thus enrolled under her banner?

From the original work we now turn to the "Translation" recently published by Dr. Knox; and we desire to know, in the first instance, in what spirit, and for what objects, it has been undertaken? And, next, to what extent it has been successfully accomplished? With regard to the first point, Dr. Knox has afforded us the requisite information, in the following words:—

"Thinking it would be but an act of justice, though tardy, to place before the English reader a work of an esteemed friend, which, according to the fashion of the day, has formed the *stock in trade* of so many English, Scotch, Irish, and American literary contrabandists, I wrote M. Edwards on the subject, and received from him the following letter—a guarantee to the public that the translation has been undertaken with the author's full approbation." The letter is then given, and the following words are, we presume, to be regarded as the "guarantee" to which reference has just been made:—"Il ne peut m' être que très agréable de voir paraitre sous vos auspices une traduction Anglaise de mon petit ouvrage éléme ntaire de Zoologie."

In the next paragraph of the prefatory notice Dr. Knox proceeds thus: "As a scientific man, and a teacher of Anatomy and of the great prin-

ciples of Zoology to thousands, including the names of many of the most celebrated scientific men of the day, I ought not, perhaps, to notice the literary pirates to whom I have just alluded, were it not that, during the last hundred years, they have, in despite of many excellent English writers, greatly retarded the progress of Zoology in Britain and elsewhere, wherever, indeed, the English language is spoken."

We at first thought that the "contrabandists" denounced in the first paragraph were the same as "the literary pirates" of the other, but as the latter have been at work for "the last hundred years," this cannot be the case. A general treatise, or a manual of Zoology, must, from its very nature, be to a great extent a compilation. That, however, is no reason for not acknowledging the sources whence the information is derived, and quoting the authorities for facts but recently made known by other writers. To do so seems to us to be an act of common honesty, and nothing more. On this point, therefore, we would most probably agree with Dr. Knox, though we might require additional evidence against the compilers before assenting to the verdict: "Their views are anti-scientific, anti-educational; calculated, if not devised, to retard the progress of the human mind."

Dr. Knox proceeds thus:—

"A single remark is required, and will, I trust, suffice to explain why this translation of my esteemed friend's work occupies a considerably less space than the original. The translation being addressed to Englishmen, lovers of matters-of-fact in science as well as in other things, it became a duty I owed the public and publisher to avoid all repetitions, all French idioms, all lengthened treatment of physiological and metaphysical hypotheses; but in doing so I have scrupulously avoided omitting any fact or idea or opinion of the author. The curtailment has been in the language alone."

In conclusion, he notices the "combinations of unclassical terms" which "have greatly retarded, no doubt, the accomplishment of that object which is the aim of this work—namely, the introduction in England of Zoology as a branch of primary education."

It would appear from those words that Zoology had not yet been "introduced" into England as a branch of primary education. This announcement came upon us by surprise. We had seen, for years back, advertisements of books avowedly for the purpose of teaching the elements of Zoology to young people. We had understood that in many schools such books were regularly used; and that the use of them was gradually ex-

tending. But as the remark might possibly be intended to apply to schools under the superintendence of Government, and supported in part from the public funds, we procured a list of the books supplied to schools by the Committee of Council on Education in England, and sought for such evidence as it might supply on the question. We found in the list books treating of Quadrupeds, of Birds, of Reptiles, of Fishes, of Shells, &c.; Domesticated animals, Wild animals, and the justly popular work of the late Bishop of Norwich, "Familiar History of British Birds." We found also works of a wider range, as, the "Rudiments of Zoology," published by Messrs. Chambers; "Elements of Natural History," by Mrs. Lee; a Zoology written expressly for schools, by Gosse; another by Patterson, &c.

The books supplied by the Commissioners of National Education in Ireland likewise afforded satisfactory evidence that the importance of Natural History as a branch of primary education was fully recognised. We learned also that it was, to some extent, a qualification for teachers, and formed a part of the examinations to which those of a certain standing were subjected. We must, therefore, suppose that Dr. Knox, at the time he wrote this paragraph, was not aware of what had been going on in these countries with reference to Zoology as a branch of school education.

Dr. Knox has told us, in a passage already quoted, that he has purposely avoided "all French idioms." Yet the following phrases remind us strongly of their Gallic origin:—"Some (fishes) lead a *sedentary* life"—p. 351. "Strongest resemblance *with* those"—p. 449. "The narrow limits of these lectures do not permit us to *consecrate* at this moment more time to this subject"—p. 398. In the original the occurrence of warm weather is spoken of in connection with the metamorphosis of certain insects, the words employed being "si le temps est chaud"—p. 498: in the translation, "if the *time* be warm"—p. 398.

A more serious fault is, that the French terms are given when a very moderate amount of trouble would have enabled Dr. Knox to give a well known English word. Thus, we have "Manchat" instead of Penguin; "Echasse d'Europe" for "Stilt;" "Canard Macreuse" for the "Common Scoter," and "Butor" for "Bittern." All schoolboys are familiar with the appearance of the boat-fly and the whirl-gig; yet they would scarcely know their old friends by the names *Notonecte* and *Gyrin;* and if they read of "the *Courtiliere*, which does such mischief," they would assuredly feel puzzled, unless the figure made them understand that the mole cricket was the insect referred to.

Some mistakes of the press have, unhappily, escaped correction, though

they are very apparent. Thus, the specific term "pervonia" is applied (p. 405) both to the sirex and the butterfly, which are figured on that page. The printer of the French work has, at p. 240, given the figure of a breeze-fly, instead of that of the carpenter-bee. The error has been faithfully copied in the English translation: we are there presented with the nest of the carpenter-bee; but the two-winged insect is figured as its builder, with the name "Xylocope" (carpenter-bee).

Dr. Knox has introduced—either in the text, or as foot-notes—various extracts from, or references to, his own published works. There may be a difference of opinion whether the book has been improved or not by these additions. Into this question we do not propose to enter. We have examined the work merely as a translation, and are sorry to say that as such it does not do justice to the original, while it contains many blemishes which a little research, and a very moderate amount of revision, would have excluded. We doubt not that these amendments will be made accordingly; and the volume will then be an useful auxiliary to other books treating of kindred subjects, which have been "introduced" years ago among our recognized school-books. The careful translation of any foreign work of eminence shall ever be regarded by us with favour; and we hope to have many of them communicating to us the facts observed by our continental brethren, and the significance of those facts, as they appear to reflective and educated minds.

R. P.

Wahre Parthenogenesis bei Schmetterlingen und Bienen ein Beitrag zur Fortpflanzungsgeschichte der Thiere. Von C. Th. E. von Siebold. 8vo. Leipzig. 1856.

On a true Parthenogenesis in Moths and Bees, a Contribution to the History of Reproduction in Animals. By C. Th. E. von Siebold; translated by W. S. Dallas, F.L.S., &c. 8vo. Van Voorst. London. 1857.

Professor Owen, the author of the term Parthenogenesis, has defined it as procreation without the immediate influence of the male. The examples given are spontaneous fission, gemmation, development from germ-cells and germ-masses, or from unimpregnated ova. The term has been readily adopted by other physiologists, and some have extended the application of it to the analogous phenomena in the vegetable kingdom. Siebold, on the other hand, proposes to confine it to the last-named of the above cases.

His objections to the original use of it, indeed, appear to rest partly on an untenable ground of etymology, partly on a misconception of Owen's views, which the distinct statement given by the latter should have precluded. Owen, however, seems not indisposed to accept the limitation proposed, and suggests the term Metagenesis, for the sum of those changes which certain species undergo in the progress through successive individuals from the ovum to the perfect [impregnating and] egg-producing form, or as it has been called the Alternation of generations. The term we have enclosed in brackets seems to be redundant, and might, in fact, invalidate the definition, according to the facts collected by Siebold in the little volume which we are here to notice. The result of these would seem to be, that the animal development from a perfect egg may take place without impregnation, 1° exceptionally;—2° normally, the law prevailing either partially, as subservient to definite purposes in the social economy of the species, or cyclically through a limited number of successive generations, or permanently and universally in regard to certain groups. The evidences which Siebold has here collected are not absolutely new, but they had partly been overlooked; partly they seemed to demand that closer investigation, anatomical and historical, with which he has here supplied us, so that we are now in a condition to recognise a law of generation, of which the higher forms of animal life in the vertebrate classes have afforded no unequivocal example.

Various statements have appeared from time to time of fertile eggs being laid by female Lepidoptera secluded from all access of the male. In some of these cases the progeny has been reared to the perfect state, and the experiment has even been continued through more than one generation in succession. Indeed, the published instances are so many, and the authorities so respectable, that the rather sceptical criticism which Siebold has applied to them might appear overstrained. It has led him, however, to institute fresh experiments, guarded with all the precautions the assurance of which he misses in the previous documents, and these have obliged him to admit the fact, in respect to the common silk worm, that the female moth is capable of laying fertile eggs without impregnation. The proportion of the eggs, however, which are capable of development in this case is small, and, generally, it would appear that a natural limit is set in this way to the propagation of the species in any but the ordinary mode of generation. A very peculiar mode of limitation is indicated by an experiment of Carlier, which Lacordaire has recorded in his Introduction. Three successive generations of *Liparis dispar* were produced by secluded

females, but the last brood consisted entirely of *males*. We are led at once to connect this observation with the normal mode of generation of the drones of the hive bee. But that which appears as exceptional in the history of some other Lepidoptera meets us as a regular provision of nature in the economy of various sac-bearers of the families Psychidæ and Tineidæ. Here the generations of wingless females succeed each other, without access or production of the winged male except at distant periods. How far these periods are subject to rule we have no satisfactory evidence, or that there is any decline of the vitalizing energy of the female organization in the course of generations. In the *Psyche helix*, as observed by Siebold, the females alone have occurred during seven successive years, and the male insect does not appear to be known with any certainty, if that sex exist in nature. For here we may be approaching to the most complete exemplification of Parthenogenesis, exhibited in the case of certain groups of insects, where the species is constituted, solely and at all periods, by females producing perfect eggs, and undistinguished, as it seems, by any visible peculiarity either of redundancy or defect in the reproductive organs. This is the case in all the true Gall-flies,—the genus *Cynips* as restricted in recent times,—and a few more (*Biorrhiza*, &c.), while the rest of that family, and even genera approaching the gall-flies so closely in structure and economy as the genus *Teras* for example, present both sexes, and the males usually even in the greater numbers. This perfect type of Parthenogenesis is, probably, not limited to the class of Insects, as there is evidence of its prevalence in certain Entomostraca, at least.

No form of Parthenogenesis, however, seems more remarkable or instructive than that which is present in connection with the economy of the common honey-bee. Many strange mistakes have prevailed from early times as to the history of the perfect societies of these insects, ruled by laws of instinct which have stimulated the curiosity of man, as much as their productive industry has served his uses and attracted his observation. But it has been only at a comparatively recent period that the true characters of the sexes have been anatomically fixed; and these discoveries have not yet succeeded in dispelling, among the practical bee-keepers in general, either inveterate errors or wild conjectures. Yet it is to one of this class, Dzierzon, pastor of Carlsmarkt, in Silesia, that science ultimately owes the discovery of the true physiological relations which rule the generation of the race. The main facts are these:—the Queen bee, or perfect female, before impregnation lays eggs which produce Males only. After impregnation, which takes place but once in the course of her life time, the eggs pro-

duce male or female larvæ according to the sort of cells in which they are laid. By a delicate and difficult microscopical examination Siebold has proved that the eggs laid in the queens' and workers' cells have been penetrated by one or more Zoosperms, which, on the other hand, are never found in the eggs deposited in drone cells. He concludes, with reason, that the access of the impregnating fluid contained in the receptacle is cut off at pleasure by an instinctive act of the female in oviposition. The worker-bees, or females with undeveloped organs of generation, being incapable of impregnation, in the rare cases in which their ovaries are sufficiently developed to mature a few eggs, these produce only male brood.

We have not space to do more than allude to various other interesting topics which Siebold has linked to these inquiries; the improved bee-hives of Dzierzon, which allow every single comb to be removed at pleasure, inspected, and replaced; the advantages arising from the introduction into Germany of the Italian variety of the honey-bee, *Apis ligustica*, and the results of the intermixture of the two races, as bearing on the immediate subject of the essay; as also the curious spiral cases of some Lepidopterous and Neuropterous larvæ represented in the plate, certain of which have figured as shells in some recent treatises on Mollusca; the illusory likeness being heightened, in this instance, by a sort of operculum, with which the inmate, a Phryganidan, (*Helicopsyche* Siebold,) closes the aperture of its case, before entering on its state of repose as a pupa.

The translation by Mr. Dallas acquires additional value from the notes by Professor Owen inserted in it, especially those which recall attention to the instances in which that truly wonderful man, John Hunter, has again anticipated the discoveries of modern Physiologists in their own special branches of research. The translation is made with great care and scrupulous fidelity. A sentence or two only have been omitted, which were unnecessary in the context, or seemed out of place. In a very few instances we think there is an alteration slightly affecting the sense. Thus, for example, page 12—*Bombyces* for *Spiders*; page 16—Scheven does *not* mean that the specimen he had is figured by Rœsel, but has cited the figure merely to determine the species; page 17—the *prolixity* of Scheven is by no means commended, as the translation conveys; page 21—the import and value of Blancard and Audebert's observations is very differently characterised in the original; page 24—it is not by means of the laying-tube, which has a different office attributed to it, but by the feet, that the female *Fumea* clings to the sac, as expressly stated in the original concerning this and *Solenobia* a little further on, but omitted in the English,

page 25. Again, in the following page, Siebold by no means asserts, as is implied in the translation, that the life of the female is shortened when impregnation does not take place—a statement which is at variance with the general result of observations on insects. Page 28—the sac of *Psyche helix* is described as having one whorl more than is correct, which the figure, as well as the original text shows clearly enough; page 40, near the foot—*stock* should be *hive*, &c.

These criticisms are, indeed, so minute that we should scarcely have particularized them, were it not that the interest in the subject, awakened by the appearance of this translation into English, insures for it a large circulation, as it deserves; and as that may, and we hope will, lead to further original investigations and fresh evidence of the law propounded, it would not be well to have any pains wasted in controverting particular statements with which the author is not, in fact, concerned. A. H. H.

THE MARINE BOTANIST; an Introduction to the Study of the British Seaweeds, containing descriptions of all the Species, and the best methods of preserving them. By Isabella Gifford. Third Edition. London: Longman and Co.

THIS third edition of Miss Gifford's introduction to marine botany is so much enlarged and in every way improved as to deserve to be looked on as a new work. A number of additional plates have been added, and an introductory chapter; while the systematic portion of the volume has been rendered more valuable by fuller and more accurate descriptions, by additional habitats of some of the rarer species, and by short notices of certain little known species not likely to fall in the way of ordinary collectors. The book, in its present form, will be acceptable to many young collectors and amateurs who might be deterred from the study by more formal treatises, and, equally with Dr. Landsborough's little volume, will serve as a familiar introduction to the subject. It is very portable, written generally in a clear style, and sufficiently systematic to answer the purposes of system, without being overburdened with technical terms. We heartily wish it the success which it so well merits. W. H. H.

ZOONOMISCHE BRIEFE: ALLGEMEINE DARSTELLUNG DER THIERISCHEN ORGANIZATION. Von Dr. Hermann Burmeister, Professor der Zoologie zu Halle. Erster und Zweiter Theil. 8vo. Otto Wigand: Leipzig. 1856.

NOT addressed directly to the professed Zoologist, these outlines of the chief types of animal structure, and of the relation that they bear to the general system of nature, are intended for a class—even now increasing in number—who, prepared already by a certain amount of education, have come to regard the observation of nature as a part of the habitual exercise which conduces to the full development of the faculties, and are willing to include the study of the laws of Life and Organization among the acknowledged instruments of intellectual training. As to the epistolary form into which they have been thrown, this appears to have scarcely any object but that of interrupting the long-drawn chain of systematic analysis by convenient pauses, and, perhaps, of occasionally relieving the monotony of comparative descriptions, by falling into a tone more colloquial than might have appeared to suit a formal lecture or a scientific essay. But the work does not assume, or affect, the anecdotical character of some books that are termed popular, by courtesy, we suppose, on the strength of being only superficial. The writer's thorough acquaintance with his subject, at once minute and comprehensive, his genuine—even passionate love of nature, and his eminently happy style of painting in words, have qualified him, without renouncing a scientific treatment of his materials, to make out of them two very pleasant volumes, for those, at least, in whom a taste for the exact observation of nature has been in some degree awakened, and who do not feel it a painful stretch when they are obliged to concentrate their attention, and to reflect and compare, as well as perceive and remember.

The author's design, not less than the compass of the work, has excluded, for the most part, those circumstantial examples among which popular books of Natural History delight to revel; but these have not been superseded for the sake of introducing some questionable speculations, or investigations of a difficult and slippery sort. If elsewhere Burmeister, in the pursuit of a natural classification, may have appeared sometimes to attach undue importance to the earlier stages of structural development, in comparison with the finished type to which, in every instance, they may be viewed as continually tending; yet here, at least, his riper judgment and experience has revolted against the fixed ideas of some extreme devotees of Embryological study; and he appeals from their verdict, who

can see nothing in animated nature more profoundly significant than their "ciliary epithelium" and the "segmentation process."

Whatever may be thought of the freaks of fancy that some of its votaries have indulged in, however we may reprobate the perversions of truth and common sense which have been engrafted on it in certain quarters, this much is fairly to be said of the Transcendental school of Natural History, that its original principles were calculated to suggest, to a reverential spirit, some of the most striking arguments which Natural Theology has to offer for the infinite wisdom and universal agency of one God. Nay, they seem to be such as can scarcely fail to excite some notions of this sort in any unprejudiced mind, even when the distinct acknowledgment of that presiding intelligence is most studiously eschewed by the teachers of natural science, and although "God," "Creation," and "Providence" be set aside for such equivocal terms as "Nature," "Law," or "Necessity." It might appear, too, as if the systematic part of Natural History were thus placed on a more unalterable base, in being referred to certain principles exterior to and independent of the modes of operation of the human intellect; as a mere artificial instrument of which classification has sometimes been regarded. It is all the more surprising to find Burmeister, who has laboured before so hard, and, as many may think, so successfully—whatever he himself may judge of it now—to establish a natural classification on philosophical grounds, in the present work almost giving up the objective truth of natural groups in zoology, while he retains them for a method of exposition. "The only real existence is the lowest and last division, called Species; this alone can be seen, felt, caught, exhibited in collections;—all the other superior groups are mere conceptions, framed according to the agreement of certain characters, but of which the real existence must be denied. There exists neither Bird nor Fish, but only a Sparrow, a Crow, a Hen; or a Carp, a Pike, a Herring, &c. —the first three are Birds, the others Fishes, but none of them a mere Bird, or a mere Fish." The fallacy here is so palpable that it is hard to comprehend how it could for a moment have imposed upon a philosopher like Burmeister. The argument—if it is good for anything, and not a mere play upon words—goes equally to negative the real existence of species. After he had said, a little way back, that in an army the individual soldier alone has a real existence, why not affirm that individual animals alone exist, and not species—that no one is a mere man, but also John, or James, &c.— that is, distinguished by some marks—be they but particular existence in a definite portion of space and time—from every other man. It is clear that

he has mystified himself by an equivocal use of the term, "real existence." He proceeds—"Such conceptions, which have no real existence, but can be defined ideally by a certain collection of characters, are called Types of Animal Organization. Accordingly, we speak of the types of Genus, Family, Class, &c., and we endeavour to discover by observation the essential properties of each, and to express them in words. These words constitute the character of the group; they convey the definition of the idea, and contain the marks by which the type may be known, and which, therefore, are considered as typical of the group." This, we see, is in allusion to, but not quite in accordance with, the doctrine of Linnæus, that the character does not make the genus, but the converse. That very real existence of species, to which Burmeister yet clings—as it seems, however, not without a wavering faith even as to this—as the last floating straw of a drowning system, is just as truly an abstraction of the mind as any of the higher groups. Define it as we will, the idea of species comprehends some relation which cannot be seen, felt, or exhibited corporeally—such as that of continuous generation from one stock; or, if we admit that no irrefragable proof has yet been adduced of the necessary descent of all the individuals of a species from one original pair, or parent, then our idea of species must differ still less in kind from that of any higher group. We must be able to conceive, as possible at least, if we do not actually assume as true, the original existence of several individuals and one species, to which they are subordinated not by that peculiar relation of Generation, but by other agreements, of the same sort, and only greater, in number or degree, than, those we recognize among the higher groups, and in the one case as in the other, coupled with Differences;—whether these be Specific, Generic, or simply Individual, does not materially affect the present question. In this case, whether we trace these correspondences up to Creative Design, or view them simply in reference to our own Modes of Perception, the result is equally that those Relations and Agreements, and, consequently, also, the Groups connoted, or denoted, by the character, have a Real existence as truly in the Higher (genus, &c.), as in the Lower (species)—yet not Lowest group so long as some individuals of the Species present fewer differences and more points of agreement among themselves (Races, Varieties, &c.), than others. Again, whatever be our Idea of "Species" abstractedly, the Character of any particular species is a collection of marks of a precisely similar nature with those which make up the character of a Genus, or any higher group, differing only in being more numerous and particular, inasmuch as the character of the Species includes

the complete character of the Genus, and of every higher group, in direct ascending Series, and something more. In Direct ascending Series—we repeat—for the Character of some genus, in another, i.e. Collateral series, may embrace more numerous marks than that of a Species not subordinate to it. Practically, too, it is the *character* that determines the idea of the species, which is then of the same sort as that of genus, &c., and applied in the same way, so that it is hard to tell why the one should be said to have a real existence more than the other.

It is, of course, only in one point of view that Burmeister disputes the existence of Natural groups. That there are *natural* groups, according to the perceptions of our own minds, seems to need no further proof than the universal method of human language (admissible evidence in a question of this nature), and the fact of our being able to make any true general propositions concerning the things we observe in nature, of such a sort as form the basis of Burmeister's own graphic sketches, which, if sufficiently divested of technical affectation to be both attractive and intelligible to all who have availed themselves of the advantages of a liberal education, are, at the same time, imbued with such intrinsic learning, that the most advanced need not disdain to study them, for the sake of their own proficiency as well as delight.

We fear our readers will think we have been prolix in this dry discussion of the point on which we have ventured formally to dissent from the view that Burmeister has taken here. We find a much more agreeable employment in turning to the body of the work, to which we can offer the meed of almost unqualified commendation. The matter here is too condensed—the phrase too pregnant—to admit of further abridgment for the purpose of a review. As a specimen of the author's manner, we extract the concluding section of the history of the Polyps:—

"The study of the formation of corals at the epochs anterior to history, or, if another form of expression is preferred, in pre-Adamitic times, is a subject of the deepest interest for the geologist. It shows him the wonderful activity of these minute creatures on the largest scale, while it proves the complete agreement of organization between the most ancient Polyps and those in being at the present time. In all periods, going back to the most remote antiquity of the globe, there have been Polyps in our terrestrial seas, at least as long as organic life has existed on the earth at all. It is corals that furnish the most ancient evidence that the earth was inhabited long before the beasts came into existence. The organization of these primitive corals agrees completely with those now living. We meet, indeed,

in the oldest strata, with genera distinct from, yet closely resembling, those of the present day; but even at that period all the existing families were represented. In general the oldest forms of corals appear as flatter, lower, more solid stems, inhabiting the bare rocky coasts, in that period before a strand was formed, where they multiplied to a vast extent; but in consequence of the disconnected form of the rocks to which they were affixed, they formed, as we see, no such great mural reefs as in later times, when the unbroken lines of coast descending sheer into the sea, with a rocky bottom, afforded a more suitable foundation to build up their stony walls. Certain members, however, of the oldest Silurian Calcareous rocks—as the limestone of Dudley, Schonen, Reval, Eifel (at Bensberg in particular)—seem to be chiefly formations of coral, which, if not constructed quite as solid reefs, are yet principally composed of the fragments of polypidoms. It is remarkable that the shells of the Polythalamia, so abundant in recent times, are almost entirely wanting in the most ancient coralline limestones. The most probable explanation is the absence of flat coasts at that remote date; since the Foraminifera occur only in such situations, and at the present day inhabit in the greatest numbers the lagoons of the coral islands, or the channel between the reefs and the land to which they form a barrier. There do not seem at that early period to have been any shallows of this sort."

"The coral formation shows itself in uncommon plenitude in the calcareous rocks which constitute the base of the Carboniferous system. The Mountain limestone, as well as the Dudley limestone, is at least partially, a vast coral bank, to the formation of which the calcareous shells of Foraminifera have largely contributed."

"Similar phenomena continue to occur in the calcareous formations of later date, almost all the sedimentary rocks of this class presenting local evidences of ancient coral formations, being composed chiefly of the stems and not of mere debris of corals. We may cite, for instance, the remarkable Dolomites of Lubenstein and Altenstein, Konitz and Pösneck, at the south-western extremity of the Thuringian forest, not far from Salzungen, which are standing yet unmistakeable rocks of coral, the reefs that once bordered the narrow island ridge of that district, like those of the south-west coast of New Caledonia at the present day. This is another evidence that the former temperature of those seas was much higher than that now prevailing in the Temperate Zone; as the coral animalcules cannot live below 20°–23° of heat by Reaumur's scale. None but warm seas have

coral reefs, and even there only in particular situations favourable to their formation."

"The extensive system, denominated the Muschel-Kalk, is singularly characterized by the scarcity of its corals; in no portion of it is there any unequivocal evidence of the existence of coral reefs. This formation seems to have been a purely sedimentary deposit, the organic fossils of which belong chiefly to the class Mollusca, as the name itself (shell limestone) indicates."

"The coral banks of the Jura are developed in inverse proportion to this last. No other formation affords such decisive evidence of the effective part which the coral animals have taken in the formation of the upper strata of the globe. The members of this group, in their protracted parallel layers and defined terraces, exhibit, in unaltered position, walls of rock built up entirely of coral, and, at the foot of these, huge masses of coral debris which have been cemented by finely comminuted particles of lime, telling of the raging surf that broke against those reefs in days of old. These fragments are intermixed with other fossil remains varying with the localities, and form united a motley conglomerate, which is known under various names, but most commonly as Coral Breccia. Generally, the coral reefs of the Jura have more the character of Barrier reefs, and they seem to have extended parallel to the coast at a moderate distance from it, as exemplified in the coral reef of New Caledonia. Such a reef extended, during the Jurassic period, right through the south of Germany and the west of Switzerland, from the neighbourhood of Geneva away to Ratisbon, and thence northwards to the river Main, between Bamberg and Baireuth."

"Not less extended was the system of coral reefs in the succeeding Cretacean period, the greatest part of the chalk being derived from corals, at least as a deposit. In the chalk period there existed already large land-locked seas, such as the Red Sea at present; and on the shores of these the coral animalcules wrought in undisturbed tranquillity, and in concert with innumerable Polythalamia, deposited the whole mass of the white chalk, which is more than five hundred feet in thickness. The effective part which the Polythalamia have had, ever since, in the formation of the calcareous rocks, shows that flat tracts of coast have prevailed extensively. We have compared the terraces of the Jura to Barrier reefs, in the chalk we find more resemblance to the Lagoon reefs ("Atolls"); although the chalk basins were not, strictly speaking, Lagoon islands, but

rather were formed as promontories of pre-existing higher lands, contiguous to great bays of the ocean."

"Subsequent to this period, the formation of coral reefs took place only in particular localities, as we find it at the present day. The Tertiary period presents no more vast calcareous formations of coral purely; the function of the coral animals in depositing lime has become more of a local nature, confined to some favourable situations; while the secretion of lime by the Polythalamia, an agency which was wholly unknown at the earliest epoch, assumes a more and more predominant influence in the formation of the surface of the globe, as we approach the present times. The Nummulite limestone of the Mediterranean beach, the Calcaire Grossier of the Paris basin, the Molasse of Switzerland, and the sub-Appenine limestones, are composed almost entirely of the shells of these minute, but tough creatures, whose indefatigable industry has furnished one of the best and most important of building materials for the use of man. Almost the whole of Paris is constructed of the shells of Foraminifera, and the material of the Egyptian pyramids themselves is a limestone, accumulated ages ago, of countless millions of Nummulites."

"I have now, my friend, set before you, as I consider, the most essential and interesting facts in the Natural History of the Polyps; but you may still be curious to know on what the little creatures live, as this has not been mentioned yet, although their alimentary organs have been described before. There can be no doubt that their chief food consists of living animals, and that the Polyps, in general, swallow these whole, having drawn them within their reach by means of the current created in the water by their cilia, or having caught and benumbed them with their stinging lines. This may be easily verified in the freshwater Hydra. The stomach, in most of the marine Polyps, is generally found empty, and seldom filled with any large bodies. They must be able to endure long abstinence, and content with small particles of food. What means, indeed, have they to master the larger animalcules? The current which they create, their chief means of obtaining aliment, is too feeble to overpower those of any bulk, neither are their tentacles long enough to reach and envelope such. Vegetable matter does not seem to enter into their alimentary cavity, probably because it is not fit for their sustenance. There are, indeed, plants floating freely in the sea, but this only in a few situations, and these are far too bulky to be swallowed by a Polyp, while it has no organs with which to detach from them smaller portions. A Polyp cannot

gnaw, but is obliged to wait till a piece comes adapted to his swallow; and that is much more likely to be an active moving animalcule than an alga spore, the only vegetable substance to be had in any quantity in the sea. I think we may safely conclude, therefore, that the food of all Polyps consists chiefly of living animals of no considerable size, and that, in particular, the small and partly even microscopical Tunicata, the fry of Mollusca, the minute marine Annelids and Crustacea which illuminate the surface of the ocean by night with innumerable sparkles of phosphorescent splendour, constitute the principal substances which the Polyps assimilate for their sustenance and growth."

The arrangement of the Animal world, which Burmeister follows in the present work, is, in a great measure, an amplification, and a more scientific filling up of the sketch which forms the concluding portion of his "History of the Creation," in the shape it wears in the latest edition. In the main, he has not departed from the principles of the classification proposed, a quarter of a century since, in his "Class-book of Natural History," and which was exhibited more at large in the "Manual of Natural History," 1837. The investigations of late years, so diligently pursued, and with such fruitful results, regarding the structure and history of the lowest classes of animals, it is true, have afforded much new materials, of which he has not been slow to avail himself here; but this has tended rather to complete what remained imperfect, and to elucidate that which was obscure heretofore, than to effect a revolution in the ground plan of the system generally. Accordingly, we find the Bryozoa still ranked among his Polyps, yet not without a distinct acknowledgment of the tendency among them to bilateral symmetry, which, with certain other characters, has induced some of the most accomplished zoologists of the present day to place them rather in the Molluscan series, and next to the Tunicata. The Rotifera are still arranged under Crustacea, and the Myriapoda continue associated with the Arachnida. The Polypi and the Acalepha, among the Regular animals, are treated with much particularity and some apparent predilection; all these, as well as the Irregular animals, in the first of these two volumes. The Symmetrical animals commence with the second volume. For the specialities in the class Mollusca, Burmeister has availed himself of the able assistance of his former pupil, Dr. Giebel. The classification of the Worms is, perhaps, the portion of the work which is stamped most strongly with originality. Commencing, as is usual, with the intestinal worms (Helminthes), the most simple of the class in their organization, Burmeister adopts the conclusions of Lieberkühn, assigning

a place, the lowest, among them, to certain Unicellular animals (*Monocystis*, &c.) ; the *Gregarinæ* following next,—while he disposes of the *Psorospermia* in a somewhat different way, as merely embryo forms of these. With the Trematodes and Planariæ the Leeches also are associated in one order (Platodes), Flat worms. The Round worms (Gymnodermi) include the families Siphunculini, Priapulidæ, and Echiuridæ,—all comprehended under the common appellation of Mud worms (Gephyrei), —as well as the proper Nematodes. In the remaining order, Annelides, Burmeister's divisions do not vary materially from the views of Grube, except as regards the removal of the Leeches from this order by the former.

The two volumes published bring us as far as to the end of the Arachnida. There remain, then, of Arthropoda the entire vast class Insecta, and the sub-kingdom Vertebrata, for the subject matter of another volume. Burmeister has briefly indicated here the mode of treatment he contemplates in regard to these ; the space reserved for the Insects being very strictly limited, in consideration of the length at which he has handled them already in other works devoted to that class specifically. The promised appearance of the concluding volume is postponed, however, until the author's return from the second travels, which he has newly undertaken, in South America. We will not here anticipate the criticisms we may be again obliged to enter into, when Burmeister shall have reached the culminant point in the scale of animal organization, at the deferred conclusion of the "Zoonomic Letters ;" for he has betrayed, of late, a wavering in his allegiance to the views he had embraced before, in common with all the most eminent names in Zoological science, touching another doctrine of not less interest than that agitated in the earlier letters, and on which we have already remarked. Rather let us wish him, on his distant pilgrimage, health and the bland favour of propitious elements ; along with which, large gatherings of scientific fruit, for the materials of future instruction and entertainment of many readers, and ourselves included.

A. H. H.

Manual of the Botany of the Northern United States. By Asa Gray, Fisher Professor of Natural History in Harvard University. Second Edition. New York. 1856.

This work, designed for the use of students and practical botanists in the United States, will be found very useful to all persons in this country who may have received collections of dried plants from transatlantic friends or

relatives, or who may cultivate North American shrubs or flowering plants. It forms a complete flora of all the northern states east of the Mississippi, and includes, to the south, the extensive territories of Virginia and Kentucky. "This southern boundary," its author tells us, "coincides better than any other geographical line with the natural division between the cooler temperate and the warm-temperate vegetation of the United States; very few characteristically southern plants occurring north of it, and those only in the low coast of Virginia, in the Dismal Swamp, &c. Our western limit, also, while it includes a considerable prairie vegetation, excludes nearly all the plants peculiar to the great western woodless plains which approach our borders in Iowa and Missouri. Our northern boundary, being that of the United States, varies through about five degrees of latitude, and nearly embraces Canada proper on the east and on the west; so that nearly all the plants of Canada East on this side of the St. Lawrence, as well as of the deep peninsula of Canada West, will be found described in this volume."

The number of species described is 2,928, divided as follows:—Dicotyledons, 1,713; Monocotyledons, 638; Ferns and Filicoids, 75; Mosses and Hepaticæ, 502. The remaining Cryptogamous orders are omitted. The descriptions, without being needlessly prolix, are sufficiently full to enable a student readily to ascertain the name of a species; and he is further assisted by the arrangement of the type—the most important or striking feature of each species being italicised, in the manner now so frequently and so usefully introduced into local floras. Synoptic tables of the genera are given under each natural order, by which means the labour of ascertaining the genus to which a plant belongs is greatly lessened; and, for the use of young botanists, an artificial key to the natural orders is prefixed. The genera of the Cryptogamia are ably illustrated in fourteen excellent lithograph plates—a most important aid to the student unacquainted with the systematic arrangement of these tribes. The descriptions of the Mosses and Hepaticæ are from the pen of Mr. Sullivant, one of the ablest of living muscologists, "who has," says Dr. Gray, "included in this edition all the species of *Musci* and *Hepaticæ* known to him as natives of any part of the United States east of the Mississippi, and has sedulously elaborated the whole anew; not only laying a broad foundation for a knowledge of North American Muscology, but furnishing botanical students with facilities for the study of these two beautiful families of plants, such as have never before anywhere been afforded in a book of this kind." We cordially endorse this well-deserved encomium.

It is needless to speak of the manner in which Dr. Gray has executed

his own part of the book. Like all his other works, it shows the combination of skill in treating his subject with perfect familiarity with the details. No living botanist is so competent to describe the plants of North America; and no one has done more than he to illustrate the flora of his country; nor is any one so unceasingly at work, and few so prolific with the pen. Would that we could add that *all* the works of our excellent friend were brought to a like happy terminus as the present; and, specially, that the "*Flora of North America*" (Torrey and Gray) were among the number. To the deep regret of all botanists, that invaluable work, commenced in 1838, after reaching Compositæ in 1843, seems to have been cushioned by its authors for the last thirteen years.

W. H. H.

Preliminary Notices of the Invertebrate Animals collected in the United States Expedition under Captain John Rodgers to the Southern Pacific Ocean. By W. Stimpson. Part I. (From the Proceedings of the Academy of Natural Sciences of Philadelphia, February, 1857.)

In the twelve pages before us we have, printed in small brevier type, a list of all the species of the Turbellaria Dendrocœla, which were taken in the South Pacific Expedition sent out by the United States. This class of animals is very nearly allied to the Annelida; in fact, the one class merges into the other by almost insensible gradations. We have but few representatives of it in our British Isles, but the common Elasmodes (Planaria) flexilis will serve as a good example. Mr. Stimpson applies the name Dendrocœla to the whole tribe, in this following Diesing. He also divides it into two sub-tribes, Digonopora and Monogonopora. Appended to the list of species found we have descriptions of fifty-two new ones; many of them, we remark, taken "in portu, Hong Kong." The genus Planaria *Müll*, is placed under the sub-tribe Monogonopora (apertura genitalis unica), whereas the Planaria of Dalyell, Gosse, and others, represented by flexilis, stagnalis, &c., is merged into the genus Elasmodes of LeConte, and placed under the sub-tribe Digonopora (aperturae genitales duæ. We trust that we shall have the pleasure of noticing the various parts of these most valuable Notices as they appear, and that when complete we may be able to give our readers a critical review of them. The author proves himself to be quite conversant with all our lately published British works on this subject; and we might, in conclusion, notice that the Leptoplana tremellaris of Oersted is not thought by him to be identical with

the species figured in Gosse's Marine Zoology, Pt. I., fig. 125. This we are not surprised at, as even with the aid of Oersted's Plattwürmer,—an admirable monograph as it is,—it is a most difficult task to identify the species of the genera of this order.

Flora Vectensis; being a systematic description of the Phænogamous or flowering Plants and Ferns indigenous to the Isle of Wight. By the late Wm. Arnold Bromfield, M.D., &c. Edited by Sir W. J. Hooker and Thomas Bell Salter, M.D., &c.

From the early days of Johnson's "Itinera in agrum Cantianum," published in 1629-1632, down to the present time, it has been a favourite practice of British botanists to illustrate the vegetation of particular provinces or counties, or even of isolated parishes, by writing special treatises on the plants indigenous to them. The value of these district floras has been generally admitted, and one after another has been hailed with interest by the public, until at last it may be said that no country possesses an equal number of such useful guides to the young botanist as England, notwithstanding that there is much still to be done. We have our local floras of Devonshire, of Shropshire, of the Malvern Hills, of Charnwood Forest, of Yorkshire, of Poole, of Liverpool, of East Kent, of the Channel Islands, of Reigate, Surrey; of Bath, of Oxfordshire, and many of the English districts; of Edinburgh, of Glasgow, of Lanarkshire, of the Hebrides, and others in Scotland; and though district floras are yet nearly desiderata in Ireland, we may at least mention two floras of the whole island, and a sketch of the flora of Cork as a good commencement. Hitherto, no adequate account of the vegetation of the Isle of Wight has been published, and this is the more remarkable as there are few places more visited by summer tourists, or so accessible from the metropolis, or that afford within a moderate and strictly defined limit a more interesting field for the botanical student. Situated on the southern coast, and diversified by hill and dale, and with a considerably complex geological structure for so small an island, it enjoys many privileges as a botanical province in miniature.

The work before us is, unfortunately, a posthumous one. It had been long in preparation by its accomplished author; but he was not spared to complete it on the original design, and it is, therefore, notwithstanding the care of the editors, but a fragment. Very properly, as we think, the editors have preserved it as nearly as possible in the state in which it was left, merely inserting between inverted commas and brackets such matter as was abso-

lutely required to fill up the blanks in the descriptions. The author's design in undertaking it is thus described in the editorial preface :—

"Dr. Bromfield became resident at Ryde, in the Isle of Wight, in the year 1836, and shortly afterwards conceived the idea of preparing a Flora of the Island. He was not content to follow the usual practice in the making of local Floras and Faunas, and to be satisfied by merely presenting a tolerably full list; but he determined that the investigation should be very complete, and that every species should receive an original description. Nor was he satisfied with a mere cursory research in the framing of these descriptions, or with copying any character from other authors unverified by his own examinations. He was also equally careful to avoid describing general characters from individuals or varieties, and endeavoured with immense and most persevering care to select such points as are really the permanent and essential characters of genera and species. To ensure this result he was in the habit of obtaining a very great number of specimens of each species, collected from various localities; and, whenever practicable, he endeavoured to compare Isle of Wight specimens with those collected at a distance. Having thus secured sufficient material for investigation, his next aim was to consult every author within his reach for all the characters which different observers had noticed. For this part of his plans he had collected a very ample botanical library, especially of foreign authors. The characters, however, observed by others were, for his own descriptions, merely suggestive, none being recorded but such as, after careful examination, he himself found to exist in nature. The results of these careful investigations were the most accurate and elaborate descriptions that can be well imagined; but such were the time and labour bestowed on each species—as much as many authors would give to a genus or family—that this circumstance very materially retarded the progress of the work."

It is a thousand pities that a design so well devised and so ably commenced should have been left incomplete. The usual fault of the writers of local floras is, that their attention is so concentrated on the plants of their own little district that they neglect the examination of kindred types from distant localities, and so they are frequently induced to multiply false species, by giving specific value to characters that depend on modifications of soil or of climate. Dr. Bromfield took special pains to avoid this error. Indeed, in his many journeys, for he travelled extensively in America and Europe (and at length ended his days in Syria), he must have seen the same species putting on many forms, according to the locality in which it grew; and would thus be prepared for that careful enquiry into the value of specific differences which his writings display. The detailed descriptions of species, so far as they were finished, are models of careful description, and will be found well worth the study of the descriptive botanist. The localities recorded under each species are, as might be expected, very full; a topographical index to all the "villages, farms, seats, woods, &c., mentioned as stations for plants, with their bearings and distance from the nearest market town or place of note," concludes the volume, and a large and carefully executed folding map of the island, mounted on linen and furnished with a stout cover, accompanies the work.

In a brief introduction of 14 pages, the climatical and geographical conditions of the island are summed up, and a sketch given of the general character and distribution of productions. We could have wished this chapter had been extended. The opening sentences, which are as follows, will serve as a sample of the author's manner and matter.

"From the situation of the Isle of Wight on the southern boundary line of the agricultural zone of Watson, we everywhere recognise the appropriate features of the latter in the general aspect of vegetation, whether native or introduced. We find the cultivation of wheat predominating over that of all other grain, and producing as plentiful returns on the exposed crests of the loftiest cliffs, or within a few yards of the sea beach, as in the sheltered vallies of the interior. The Vine and the Fig are common, even in the cottager's garden, the latter always, as a standard, bearing abundant and luscious fruit; whilst, in addition to the more ordinary orchard trees, the Quince, Walnut, and Mulberry ripen perfectly, and produce plentiful crops. Both the narrow and broad-leaved varieties of the Myrtle *(Myrtus communis)* form stout bushes in the open air, and mature their fruit in many places, even on the north side of the island and in the cold soil of Ryde, suffering in very severe winters only, and are then seldom more than partially killed back in exposed situations, as many very old and vigorous trunks attest in various places. The sweet Bay *(Laurus nobilis)* attains the dimensions of a tree, and ripens its berries in abundance, resisting our severest frosts, as does the Laurustinus, which gives to our gardens and shrubberies at mid-winter the verdure and bloom of summer, though its fruit is more sparingly perfected. The Strawberry tree *(Arbutus unedo)* is equally common and hardy with the two last, fruits pretty freely, and grows to a tree of respectable size, though inferior to the timber-like dimensions it acquires on its native rocks in the S. W. of Ireland, or even in the S. Western counties of England, where the greater moisture of the atmosphere eminently favours the development of this, as of most other evergreens. But if the greater cold of our climate in winter, and the greater dryness at all seasons, tend to check the growth of these and other sempervirent plants, the comparative absence of humidity and a less clouded sky enables the increased heat of summer to ripen the wood, and so fit it to endure a degree of frost it would else be unable to withstand. So happily balanced, in the climate of the Isle of Wight, are the vicissitudes of heat and cold to which it is occasionally subject from its proximity to the mainland and to the continent of Europe, in a degree unusual to insular situations, that the former repairs, or rather counteracts, the destructive agency of the latter in vegetation."

A lithographed portrait of the author is prefixed to the volume, which contains 678 closely printed pages, besides XXXV. of preface and introduction.

W. H. H.

THE TESTIMONY OF THE ROCKS; or, Geology in its bearings on the two Theologies, Natural and Revealed. By Hugh Miller, Author of "The Old Red Sandstone," &c. Edinburgh: Thomas Constable and Co. 1857.

IT would be difficult for any reader, even slightly acquainted with the circumstances attending the appearance of the work now open before us—posthumous as it is, at least in its publication—to glance over its pages

unmoved; while for any person who has become conversant with the mental productions of its late lamented author, and acquainted with his autobiography, to peruse the volume without the deepest emotion is impossible. Hugh Miller was not only one of whom his country and his class were justly proud, but a man whose wondrous natural endowments, as well as dazzling scientific acquirements made under such peculiar difficulty, all the educated and thinking portion of civilized mankind, his contemporaries, regarded with well-merited admiration. Under the influence of such feelings, deepened and heightened by a recollection of the awful circumstances under which the grave has so recently and so prematurely closed over what was mortal of this extraordinary man, we address ourselves to the task of reviewing this his last contribution to the science and literature of his country. We may, at the outset of our remarks, state, that although "The Testimony of the Rocks" might well demand a lengthened notice in our pages, the space already assigned to other matter necessarily enjoins brevity—a restriction in which we can acquiesce the more readily from the conviction that not a few of our readers will, even before this review meets their eye, have made themselves acquainted with the book itself; and that the great majority of those who have not already done so will ere long follow their example. The largeness of demand for the volume at its first appearance, and the rapid multiplication of its impressions already, fully justify this anticipation.

The design of this remarkable treatise is stated by its author briefly in the opening sentence of its graceful dedication to one of his justly valued friends, wherein he writes that the "volume is chiefly taken up in answering, to the best of its author's knowledge and ability, the various questions which the old theology of Scotland has been asking for the last few years of the newest of the sciences;" or more definitely, as follows, in the opening lecture of the series:—

"In an age in which a class of writers not without their influence in the world of letters, would fain repudiate every argument derived from *design*, and denounce all who hold with Paley and Chalmers as anthropomorphists, that labour to create for themselves a god of their own type and form, it may be not altogether unprofitable to contemplate the wonderful parallelism which exists between the Divine and human systems of classification; and remembering that the geologists who have discovered the one had no hand in assisting the naturalists and phytologists who framed the other, soberly to inquire whether we have not a new argument in the fact for an identity in constitution and quality of the Divine and human minds, not a mere fanciful identity, the result of a disposition on the part of man to imagine to himself a God bearing his own likeness, but an identity real and actual, and the result of that creative act by which God formed man in his own image."

From the above extract it will at once be perceived that the treatise was

designed to be partly scientific and partly theological, and so it is. As such it presents a just reflection of its author's gifted mind, viewing, as was his wont, all subjects in the light of that revealed truth which he was taught in childhood, and the reverence for which he carried to his mysteriously premature grave. In making this statement we entertain no scruples, nor yet any fear of raising an imputation on the Christian religion, which the late Hugh Miller, in common with ourselves, professed. The deep-toned manly piety which runs through this remarkable volume from its commencement to its close, were there no other proof forthcoming, would in itself be sufficient evidence that the sad act which terminated at once life and his brilliant literary career, was not chargeable on his religious opinions, but the result of an over-wrought brain, ending in *bona fide* physical derangement, and, therefore, the act of one who was at the time morally not accountable.

While this characteristic of the volume, as we have said before, so greatly adds, in one point of view, to its interest, we are free to confess that we should have greatly preferred to see its elements separately handled by its late gifted author. The circumstances under which it was composed and given to the public may have rendered its present form necessary; yet, we cannot but regret that its distinctly scientific portions have not been treated rather more apart from its theological views. And this leads us to observe, on the character of the volume, generally, that it would, in our judgment, have been much more effective, as regards its avowed objects, had it been thrown into one condensed and continuous essay, instead of being allowed to retain the form of so many distinct lectures. These lectures are twelve, and the preface informs us that they were nearly all composed and delivered during a period of about five years, and before very different auditories. Four were read before "the Edinburgh Philosophical Institution," one "at Exeter Hall" before "the Young Men's Christian Association," and the substance of two others before "the Geological Section of the British Association" at Glasgow. Three of the remaining five were also, we are informed, addressed *vivâ voce* to popular audiences, so that but two appear in print, for the first time, in the volume before us.

Now, without saying a word to disparage the admirable tendency of the whole, or to depreciate the valuable geological facts which abound in the volume (especially in the two concluding lectures on the Fossil Flora of the author's native land), we must, in candour, say that we have laid down the work, as well on its first perusal, as after a second and more careful review, with a feeling of regret, if not of disappointment, that the author's mag-

nificent design had not come before the world in a more concise and concentrated form.

Recollecting the delight with which, years ago, the stone mason of Cromarty had introduced us to the marvellously beautiful and previously all but unknown organisms of the old red sandstone formation, the powerful intellect, under the control of deep piety, with which the same hand had "crumpled up" the audacious sciolist who anonymously ventured on the "Vestiges of Creation," and further, the racy native eloquence with which, in his beautiful autobiography, he had so modestly, yet so well schooled, not only the class from which he sprang, but his fellow-countrymen of every class, we must confess to the opinion that this great man, chiefly, perhaps, owing to the form which his last work has been permitted to wear, has done full justice to neither his subject nor himself.

As already remarked, the last two lectures are more strictly scientific, and herein the student of Fossil Botany will find a rich treat. It is highly interesting to observe how, in the lapse of comparatively few years, and amidst the engrossing occupations, mercantile and literary, wherein their lamented author was, of necessity, engaged, the few sparse and spare vegetable organisms which he had noted, or figured, in his work on the Red Sandstone had grown into the rich and beautiful Fossil Flora which is here revealed. We cannot but again remark, that were the substance of these last lectures embodied with, or supplemented to, that on "the Palæontological History of Plants" in the first, and these followed in succession by the sketch of Animal Palæontology in the second, the *lucidus ordo*, so necessary to the subject whose development is aimed at in the whole, would have been much better attained.

As regards the professed design of the entire volume, or of the greater portion of it, namely, the harmonizing of the two records, Mosaic and Geological, we thankfully acknowledge the obligation under which both true science and genuine religion are laid by the writer. Hugh Miller meets most of the objections raised by half-informed scepticism to the Divine revelation in the true and only way in which such ever ought to be met. He here assumes what he has elsewhere so abundantly evidenced, that both volumes, nature and revelation, are from the same Author; but, as any really deep and clear thinker perceives and admits, on entirely different subjects. Armed with these undeniable first principles, he meets and successfully foils his opponents. A specimen of the manner in which some of the questions thus introduced are handled will not be unprofitable

to our readers. Thus, for example, he writes on the hitherto much debated question of death in the inferior animals before the fall of man :—

"It has been weakly and impiously urged—as if it were merely with the geologist that men had to settle this matter—that such an economy of warfare and suffering—of warring and of being warred upon—would be, in the words of the infant Goethe, unworthy of an all-powerful and all-benevolent Providence, and in effect a libel on his government and character. But that grave charge we leave the objectors to settle with the great Creator himself. Be it theirs, not ours, according to the poet, to

'Snatch from his hand the balance and the rod,
Rejudge his justice, be the god of God.'

Be it enough for the geologist rightly to interpret the record of creation—to declare the truth as he finds it—to demonstrate, from evidence no clear intellect ever yet resisted, that He, the Creator, from whom even the young lions seek their food, and who giveth to all the beasts, great and small, their meat in due season, ever wrought as He now works in his animal kingdom—that He gave to the primæval fishes their spines and their stings, to the primæval reptiles their trenchant teeth and their strong armour of bone, to the primæval mammals their great tusks and their sharp claws—that He of old divided all his creatures, as now, into animals of prey and the animals preyed upon—that from the beginning of things He inseparably established among his non-responsible existences the twin laws of generation and of death; nay, further, passing from the established truths of *Geologic* to one of the best established truths of *Theologic* science—God's eternal justice and truth—let us assert, that in the Divine government the matter of fact always determines the question of right, and that whatever has been done by Him who rendereth no account to man of his matters, He had in all ages, and in all places, an unchallengeable right to do."

And this, after all, is the only way to meet such a question. To doubt the prevalence of death, among the lower creatures, in the pre-Adamitic world, with the stereotyped records of geologic investigation laid before us, would be, in our judgment, the act of perverse blindness. To assert that such discovered facts are counter to the revealed history of our race is most false and fatuitous theology. When, in the sacred volume, the introduction of death is predicated of sin, as its consequence, it is sufficiently plain, to any reasoning mind, unwarped by prejudice, that both this event and its results are limited to the human race. The pre-existent state of consumption and death among the multitudinous occupants of sea and land and air, so far from exhibiting to the imagination a reign of terror, presents, when fairly viewed, merely a balanced state of momentary extinction to the inferior creature, and of enjoyment to the higher and more powerful. If left, then, to settle such a question, as Hugh Miller leaves us, by reason, we feel that such a task may be performed without any strife between the revealed and the discovered truths of Genesis and geology. The distinct paths of these two great sources of our knowledge are very beautifully marked out, in the Lecture on "The Discoverable and the Revealed," and the conclusion arrived at is thus truly and tersely

stated (p. 376):—"Scripture draws practically a broad line between the two modes; and while it tells man all that is necessary to his wants and welfare as a religious creature, it does not communicate to him a single scientific fact which he is competent to find out for himself."

Owing to the disjointed nature of the contents of this volume, already indicated, we feel it impossible to give an accurately analytical survey of the subjects handled. Among these, however, two stand out most prominently, both on account of their inherent interest and the manner in which we find them here dealt with. These are, "*the Noachian Deluge*," treated of in two Lectures, the 7th and 8th, and the much debated question of *our planet's antiquity*. As introductory to our author's discussion of the theories held respecting both these questions, a highly interesting Lecture, the fourth, is taken up with an investigation of the *modus* in which the inspired historian of creation received his impressions and knowledge of the facts recorded by him. This the author, following in the wake of some continental writers, especially Dr. J. H. Kurtz, Professor of Theology at Dorpat, as well as of some of his countrymen, believes to have been by a vision, actually presented to Moses, in which the scenes of creation, progressively, from its chaotic to its perfect condition, passed before him, in a species of dramatic form. If such a question be ranked by some among the curious, we see nothing in Mr. Miller's determination of it to which, on the score of theological soundness, objection can reasonably be made.

At page 258, and the following ones, the reader will find a singularly striking exemplification of the versatility of talent which existed in the mental constitution of the departed writer. He sketches out, with great vigour and boldness of conception, what he terms "a possible poem" on creation, wherein all the phases of that glorious work, as he supposes them to have appeared to the inspired vision of Moses, are made to pass before the reader's imagination. This sketch, in some of its details, recalls to mind the lovely poem, on a kindred subject, of James Montgomery, "The Pelican Island;" but as beyond our province, we merely note this very splendid and sparkling interlude, in a volume more strictly designed to illustrate a scientific subject, as worthy of a passing comment.

As regards *the extent* of the Noachian Deluge, Mr. Miller takes the view previously adopted and maintained by the able and pious American writer, Hitchcock, namely, that its range was limited to the then humanly peopled portion of the earth. His reasoning is grounded on the admitted facts of physical geography and geology, as well as the still existing

conditions of animal life, while a scrupulous regard is paid, throughout, to the statements of the Inspired Record, as well as the character and acts of its Divine author.

We confess that our author's reasoning on this point appears to us unexceptionable; as a specimen we present our readers with the following summary:—

"The deluge was an event of the existing creation. Had it been universal, it would either have broken up all the diverse centres, and substituted one great general centre instead—that in which the ark rested; or else, at an enormous expense of miracle, all the animals preserved by *natural* means by Noah would have had to be returned by *supernatural* means to the regions whence by means *equally supernatural* they had been brought. The sloths and armadilloes—little fitted by nature for long journeys—would have required to be ferried across the Atlantic to the regions in which the remains of the megatherium and glyptodon lie entombed; the kangaroo and wombat, to the insulated continent that contains the bones of the extinct macropus and phascolomys; and the New Zealand birds, including its heavy flying quails and its wingless wood-hen, to those remote islands of the Pacific in which the skeletons of *Palapteryx ingens* and *Dinornus giganteus* lie entombed. Nor will it avail aught to urge, with certain assertors of an universal deluge, that during the cataclysm, sea and land changed their places, and that what is now land had formed the bottom of the antediluvian ocean, and *vice versa*, what is now sea had been the land on which the first human inhabitants of the earth increased and multiplied. No geologist who knows how very various the ages of the several table-lands and mountain-chains in reality are could acquiesce in such an hypothesis; our own Scottish shores—if to the term of the existing we add that of the ancient coast-line—must have formed the limits of the land from a time vastly more remote than the age of the Deluge. But even supposing, for the argument's sake, the hypothesis recognised as admissible, what, in the circumstances of the case, would be gained by the admission? A continuous tract of land would have stretched—when all the oceans were continents and all the continents oceans—between the South American and the Asiatic coasts. And it is just possible that, during the hundred and twenty years in which the ark was in building, a pair of sloths might have crept by inches across this continuous tract, from where the skeletons of the great megatheria are buried, to where the great vessel stood. But after the flood had subsided, and the change in sea and land had taken place, there would remain for them no longer a roadway; and so, though their journey outwards might, in all save the impulse which led to it, have been altogether a natural one, their voyage homewards could not be other than miraculous. Nor would the exertion of miracle have had to be restricted to the transport of the *remoter* travellers. How, we may well ask, had the Flood been universal, could even such islands as Great Britain and Ireland have ever been replenished with many of their original inhabitants? Even supposing it possible that animals such as the red deer and the native ox *might* have swam across the Straits of Dover or the Irish Channel, to graze anew over deposits in which the bones and horns of their remote ancestors had been entombed long ages before, the feat would have been surely far beyond the power of such feeble natives of the soil as the mole, the hedge-hog, the shrew, the dormouse, and the field vole.

Taking this ground, and successfully maintaining it, in such companionship as the eminent American writer already mentioned, and the late learned and devout Dr. J. Pye Smith, and others like them, Mr. Miller's views will, we feel, commend themselves to most, if not all, who give them a fair consideration.

As regards the other theologico-geological question, as it may be termed, the age of our planet, Mr. Miller takes up, very decidedly, and expands the theory suggested first by Chalmers, and adopted by Buckland, Conybeare, Sedgwick, and others, contending that the days of the Mosaic Record are to be interpreted not of literal periods of time, of twenty-four hours length, but of vastly prolonged measures of duration, extending, it may be, to many millenaries each. In advocating this view our author, as already intimated, goes farther than the illustrious Chalmers, in his scheme for bringing into harmony the Mosaic narrative and the geologic record. That scheme taught, as, possibly, most of our readers are aware, that "between the first act of creation, which evoked out of the previous nothing the *matter* of the heavens and earth, and the first act of the first day's work recorded in Genesis, periods of vast duration may have intervened; but further, it insists that the days themselves were but natural days of twenty-four hours each; and that ere they began, the earth, though mayhap in the previous period a fair residence of life, had become void and formless, and the sun, moon, and stars, though mayhap they had before given light, had been, at least in relation to our planet, temporarily extinguished"—p. 117. This view, though he himself once also held it, our author gives up, as but partially true, and he endeavours to show that each of the Mosaic days was of the nature and length already described. Most gladly would we enrich our pages with the reasons adduced in support of this view, but we must content ourselves with commending their perusal, throughout, to our readers. We shall merely add, that, for ourselves, we are strongly disposed to accept Hugh Miller's demonstration of the harmony between Revelation and Fact on this point. These can never disagree, and, in this case, instead of disparity he points at marvellous and beautiful coincidence. Page after page in the past volume of geological research is turned over, and imbedded in its rocks are seen the traces of the great Creator's hand, to the same effect, and in precisely the same order, as the Mosaic record indicates.

We take leave of this remarkable volume, if not with all the anticipations realized which the well earned reputation of its author had inspired, yet with deepened admiration for his wonderful ability and laborious research, and still deeper regret at the awfully mysterious event, in God's permissive providence, which has bereft the sister country of one of its most justly loved and admired sons, and modern science of one of its brightest ornaments.

Tenby: a Sea-side Holiday: 8vo. With coloured Plates. 1856. London: J. Van Voorst. Price, 21s.

Manual of Marine Zoology for the British Isles. Fscap. 8vo. Part II. 1856. Price, 7s. 6d. With numerous Woodcuts. London: J. V. Voorst.

Life in its Lower, Intermediate, and Higher Forms. With Plates and Woodcuts. 8vo. 1857. Price, 7s. 6d. London: James Nesbit and Co. All by Philip Henry Gosse, F.R.S., &c., &c.

The first volume in the above list contains a detailed record of a summer holiday spent in the lovely watering-place of Tenby, situated at the entrance of Carmarthen Bay, South Wales. The information given is necessarily of a varied character, and we find ourselves at one moment invading Penally Bog in company with the fair botanists of Gumfreston, picking our steps between masses of the panicled sedge and beside tufts of the Osmund Royal. Next we enter upon a chapter that discusses a subject not more interesting, perhaps, than a botanical excursion with ladies, but still deeply fascinating as being one of those realms of cloud land that stud the horizon of the Naturalist—we refer to the chapter on the Pedicellariæ. Here, amid the opinions of Sharpey, of Forbes, Agassiz, Valentin, Sars, and many others, we fairly fear to form an opinion of our own; or if we do, we but throw a little more mist around the subject.

Such, too, is the chapter that treats about Sagitta bipunctata. Will a master-mind ever arise that can grapple with all the difficulties of natural science? or must these gordian knots be untied by the slow, persevering work of ages.

A striking feature in "Tenby" is the account of various microscopic objects. We have a whole chapter on the Rotifera, another on dipping for animalcules in Knightson Pond, and several devoted to the examination of the various animals whose united brilliancies anon cause the very sea to flash and sparkle like a lightning-lit sky.

While there is abundance of information in this volume to make it a most desirable acquisition to the library of every lover of nature—some of the chapters bearing evidence of the most painstaking research, others adding a great deal to our knowledge of the metamorphosis of marine animals—yet to the visitor to Tenby, or a naturalist living within or near this wall-girt town, it must present most peculiar charms. Hardly a cave or a fountain, not a pleasant walk or delightful old ruin, but is photographed in this volume; pleasant memories revived within as we read the pages; there, as we looked towards the Bristol Channel, lay the mighty

sea, tranquil and quiet, sparkling amid the intense glare of a July sun; for a little while we see nothing but the glittering waters,—then the pleased eye rests on the large safety buoy out on the very horizon—the rescuer from a watery, wintry grave of many a poor fellow—then Caldy Isle grows upon the view, and then the whole deep is alive with the snowy plumaged gannets; too far off, we hear not their discordant cry, but as they quickly sweep along—now seen, now lost—they rather add to than take from the impressive quietness of the scene.

St. Catherine's Rock, too, crowned with the ruins of an old chapel, now grown hoary with the gray lichen that mantles its broken-down walls and makes them look so venerable; it was a pleasant place to resort to. A winding stairs brings you to its summit, where you could lie down and study man as many a variety of this one great species walked along the yellow sands beneath you; there were happy children digging with their little spades moats and pits in the soft sand, as thoughtless of the next tide which will sweep all their work away as their elders are of the scythe of time. Or let the naturalist go beneath this rocky islet and he will find it full of caves, and in them he will find—but we won't tell him, for the volume before us does, and that in a manner beyond our pretensions.

The appendix is a great addition to this volume, especially the part that treats of the sub-division of the Actiniæ, and there is a valuable systematic index of the Invertebrata mentioned in the volume.

We must now pass on to notice the second part of the British Marine Zoology. It contains the Sub-kingdoms, Mollusca (which takes up the greater portion of the volume) and Vertebrata.

We think there cannot be a doubt but that Mr. Gosse's Manual, which this part completes, is the most useful work that has been for a long time, if ever, published. To think of bringing Mr. Van Voorst's series of works on British Natural History to the sea-side with one was really quite enough to keep one from the sea-side for ever. Why they would take up the room of an adult passenger, or of a couple of children; and then, supposing them once there, who could carry "Forbes and Hanly" in their waistcoat or any other pocket? The thing was almost impossible; but now, thanks to our author, we have, by binding the two parts in one, a nice little volume quite easily carried, quite easily referred to, and one that in future it will be quite impossible to do without.

Mr. Gosse says that, by a most singular coincidence, the number of genera in both parts—the first containing the Radiate and Annulose forms —are both alike, namely 339. Now, we really think all this allusion about

"singular coincidences" might have been omitted. Nature is not ruled by numbers; and in the very next paragraph he tells us of a supplement in which we find some nineteen or twenty genera added to the Annulose forms.

We have a very high opinion of Mr. Gosse's powers as a draughtsman, and the figures in the first part are indeed excellent; but we regret that we cannot speak as favourably for many of the sketches in the second part. We know it is not so easy to give a characteristic sketch of a Mollusc as it is of a sea anemone; but we think a little more trouble might have been profitably spent in delineating the first sub-kingdom in the part now under notice. Some of them would better stand for Egyptian hieroglyphics than for British shells—as, for instance, figures 71, 74, 99, 100, and 103. Others again, while we might be able to identify them, give very erroneous ideas of the shells, the outline being so imperfect—as 64, 73, 82, 90, 97, 104, 107, and others. We could give many more instances under both lists, but forbear. One of the generic distinctions among the Cephalopoda is one that admits of being given in a hasty sketch—viz., the arrangement of the suckers—and we would have been glad to have seen the figures of them given more in detail. The figures of the vertebrate animals are better, some of them being excellent. Figure 240, a copy after Yarrell, faithfully follows Yarrell's mistake about the caudal fin, which should have the first and last rays nearly one-fourth as long as the centre ones.

We were sorry to see that the Sea Birds were not given among the Vertebrates, as they form, in our opinion, a very essential portion of Marine Zoology; but Mr. Gosse seems to have forgotten the birds since his sojourn in Jamaica. We seldom see even a reference to them in his lately published works. Our Roseate Terns may not vie with the lovely Humming Birds of "Bluefields;" still they and their brotherhood ought not to be slighted.

Many additions have been made to our British Fauna, even since the publication of this last part; and we would suggest to Mr. Gosse that it would be advisable to publish every two or three years a supplement to these volumes, thus bringing them up to the standard of the day, and that he should give us figures of all the new genera.

The last work on our list deserves a passing notice. It gives us a very pleasing sketch of animal life from its lowest to its highest form. It is very neatly printed, and nicely illustrated; and we do not know of a better volume on the subject. The language is simple, and yet the dignity of the science is not lowered, and a pleasant, healthy tone pervades every page.

TEN ZOOLOGICAL DIAGRAMS, PREPARED FOR THE DEPARTMENT OF SCIENCE AND ART. By Robert Patterson, M.R.I.A., &c. Day and Son, London. Price, fully coloured, £2 15s.

ANIMALS—HOW THEY ARE CLASSIFIED. By Robert Patterson, M.R.I.A., &c., p. 50. Day and Son, London. Price 1s.

THOSE who have had any experience in imparting to the young a knowledge of the various organised beings which inhabit our globe must have long felt the need of a series of accurate representations illustrative of the leading types of animal life. To supply this want, the above diagrams have been prepared under the superintendence of Mr. Robert Patterson, the well-known author of "Zoology for Schools," and the little tract, the name of which we have also mentioned, has just been published, "as a key to the classification" adopted in the diagrams, "in deference to a demand made for such an explanation by many purchasers of the latter."

It is true that most professors of zoology are provided with diagrams of their own, which are, and always will be, necessary to exhibit to the student the many details of structure with which it is desirable that he should be made acquainted. But such diagrams, from their very completeness, fail in one important particular, which ought not to be overlooked—namely, of exhibiting at a single view the relations which the several forms represented bear to one another.

The object, therefore, which the present series is intended to fulfil is two-fold—1st, To give accurate figures of the individual animals selected for illustration; and 2nd, To convey correct ideas of the general principles of zoological classification.

It gives us much pleasure to state that in the first of these objects Mr. Patterson has been signally successful. It matters not which of the sheets we take up, we are sure to find in all faithful representations of the original forms. One exception must be made. No mollusca ever had the bad luck of being perpetuated in so many vile figures as that of Argonauta argo, and we are sorry to see one more added to the list in Sheet F, and not one word of correction, too, in the accompanying "Explanation." The argonaut sits in its boat, with its siphon turned towards the keel (so far Mr. Patterson's figure is right), and its sail-shaped (dorsal) arms *closely applied to the sides of the shell* (here the diagram is quite wrong, as they are *quite withdrawn*): this might have been to show the margin of the aperture; if so, why does not the explanation say so, as it is likely to confirm most

erroneous impressions? In the *grouping* of the animals considerable taste has been displayed.

In general, the selection of the species which are to serve as types of the group or order to which they belong is judiciously performed. This, however, is not always the case. Thus, of the numerous division of Edriophthalmatous Crustacea no species is shown, while four figures of Entomostraca are given.

But how has Mr. Patterson succeeded with regard to the second object which he proposes to accomplish? Has he been able to present the student with a correct and characteristic outline of the animal kingdom, according to the views of modern zoologists? To perform this satisfactorily is no easy task. Zoology is from its nature a progressive science, and whatever arrangement may be determined on is liable to receive more or less alteration from the new relations which some fresh discovery may suggest to the philosophic naturalist. But let us inquire what are the objects which a well-devised system of zoological classification proposes to effect. "The natural history of an animal (says Cuvier) is the knowledge of the whole animal." But such a knowledge, though most essential, is still insufficient. It has been well said, that "in the several tribes of organised beings we have not a mere aggregation of individuals, each formed upon an independent model, and presenting a type of structure peculiar to itself; but that we may trace through each assemblage *a conformity to a general plan*, which may be expressed in an 'archetype' or ideal model, and of which every modification has reference either to the peculiar conditions under which the race is destined to exist, or to its relations to other beings. Of these special modifications, again, the most important themselves present a conformity to a plan of less generality; those next in order to a plan of still more limited extent, and so on, until we reach those which are peculiar to the individual itself. This is, in fact, the philosophical expression of the whole science of classification."*

The systems adopted in the present day are, more or less, modifications of that of Cuvier. Since the time when that system was promulgated very many discoveries have, however, been made, which must considerably alter our views of the Cuvierian arrangement. Too hastily to adopt all the innovations which have been suggested would, indeed, be injudicious; but, still, we may regard one great fact as having been clearly established—namely, that there exist five very distinct plans of structure, or "types," to some one of which any animal form (taking into account, likewise, its

* Carpenter's Comparative Physiology, p. 10.

grade of development) may be referred. The names of these types are as follow:—

1st. *Vertebrata*—which may be divided into two sections, the first, "Abranchiata," including mammals, birds, and reptiles; the second, "Branchiata"—amphibians and fishes.

2nd. *Mollusca*, divided into two groups—1st, *true* mollusca, and 2nd, molluscoida. The last division includes the brachiopods (?), tunicates, and polyzoa.

3rd. *Annulosa*, which also is separable into two groups—1st, true annulosa, which includes insects, myriapods, spiders, and crustaceans; 2nd, annuloida, comprising echinoderms, annelids, rotifers, and the flat-bodied and nematoid worms.

4th. *Cœlenterata*, including zoophitic and acalephoid forms.

5th. *Protozoa*.—In this division are placed the sponges, rhizopods, and true infusoria.

In certain matters of detail this classification is, no doubt, imperfect. Thus, the true position of the echinodermata is still a matter of uncertainty. But, on the whole, it gives us the best general expression of the views of modern zoologists which the present state of science is capable of affording.

We are now in a position to estimate the merits of the arrangement which Mr. Patterson has adopted in his diagrams. The first great error that we meet with is that Mr. Patterson completely ignores one of the most important conclusions which the united labours of many recent researches have established, namely, that two types of organization are included under the radiata of Cuvier (*i.e.*, the last two types in the classification above given).

At page 45 of the "Explanation" we are informed that the radiata are arranged in six classes: Echinodermata, Acalepha, Zoophyta, Entozoa, Infusoria, Foraminifera, and Amorphozoa, are the names of the classes given. Any child would say that seven classes are here mentioned; but on turning to the diagrams themselves we find an explanation of this apparent anomaly; for the Echinoderms and Acalephs are included together under one class, termed "Radiaria," a name which is employed with the same signification in the "Zoology." We cannot congratulate Mr. Patterson on this original arrangement. The slight external resemblance between some of the medusa and star fishes is surely insufficient to justify any such near association of these animals, as Mr. Patterson proposes.

The only allusion to the affinity of the zoophytes with the acalepha is a

scanty extract from Professor E. Forbes' monograph on the British naked-eyed medusæ, given at page 56 of the "Zoology." But the true relation of these remarkable organisms to one another seems altogether to have escaped the notice of Mr. Patterson.

The connection between the polyzoa and tunicata is regarded by Mr. Patterson merely in the light of a close affinity, but he still thinks it proper to rank the former as one of the orders of the zoophyta. The incorrectness of this has long since been shown by the researches of J. V. Thompson, Milne Edwards, Professor Allman, and others.

The entozoa are classed among the radiata instead of among the annuloida. The correctness of this is, however, questioned at page 56 of the "Zoology."

It would be doing injustice to the author were we to have it understood that his classification is a mere copy of that of Cuvier. In more than one instance the improvements of modern naturalists are adopted. Thus, the arrangement of the mammalia is good, though the monotremes are not regarded as a distinct order. Again, the cirripeda are removed from the mollusca and placed among the articulata, next to the crustacea. It would, perhaps, have been better to have ranked them as a subdivision of the latter. The myriapoda are not made into a separate class.

The importance of the study of development does not seem to be duly recognised by Mr. Patterson. Our most eminent zoologists have long since shown that the amphibia are distinguished by sufficient peculiarities to justify their separation from the reptilia (*vide* Bell's Reptiles, page 73). Mr. Patterson still, however, regards them as constituting one of the orders of the reptilia.

In his arrangement of the birds, Mr. Patterson reduces all known species to five orders. The Scansores are by him included among the perching birds. The Columbæ are not distinguished from the Rasores; and the Cursores, which surely form a separate order, are by him placed among the Grallatores. Our knowledge of the present group is, perhaps, still encumbered with too many difficulties to enable Mr. Patterson to have arrived at a much more satisfactory arrangement.

The same excuse will, however, not serve with relation to Sheet H, in which the order Aptera most unwelcomely makes its appearance. Who does not know that the flea should be located among the Diptera, and the spring-tail among the Neuroptera, and so on with the other genera (?) of this order.

On the whole, it must be admitted that Mr. Patterson's classification

falls far short of that adopted by the majority of modern scientific naturalists. It is much to be regretted that in so excellent a series of diagrams as the present, in which the figures of many of the animals are executed with almost faultless accuracy, scarcely any use seems to have been made of the advanced views propounded by our most distinguished zoologists. One purpose of the diagrams as a most important educational instrument is thus defeated. A high responsibility attaches itself to all who are in any way concerned with the education of their younger or less enlightened brethren; much more to those who take a lead in devising those schemes of education which are entrusted to others to be carried into execution. Their very eminence causes their instructions to be listened to, when those of others would be unheeded; and if they convey false views of knowledge, or partial notions of important truths, great, indeed, will be the injury thus inflicted upon a large class of the community. With what difficulty are errors easily implanted eradicated from the youthful mind! How many have had to devote a large portion of time and thought to unlearn what careless and incompetent teachers have but too successfully instilled.

We have been thus critical in noticing these diagrams, not because we think that their defects wholly counterbalance their merits, or that the author has not rendered real service to the cause of natural history. The well-known and deserved success of Mr. Patterson's "Zoology for Schools" is a sufficient reply to such an insinuation. Nor would we be willing to surrender this much-cherished little volume for other works of far less utility, but of more pretence. But we trust that in a new edition the errors which we have referred to, both in the "Zoology" and "Diagrams," will be amended. A trifling expenditure of time and trouble will be able to effect this desirable alteration. To use the words of a former reviewer—"Statements now known to be erroneous continue to be given, without even (in many cases) a foot-note to warn the reader of the changes of opinion which are consequent upon the advance of zoological knowledge." We wait, then, in hope for a speedy correction of all these objectionable passages. We feel assured that an author who has already accomplished so much for zoology will not be tardy to avail himself of these friendly suggestions. And among the honourable names of those naturalists who have generously laboured widely to diffuse the truths of the great science which they have so successfully cultivated, few will be entitled to more lasting praise than that of Robert Patterson.

ATLAS OF BRITISH SEA WEEDS. Drawn from Professor Harvey's Phycologia Britannica. 4to, in numbers, 6s. each. Nos. I. II.

SYNOPSIS OF BRITISH SEAWEEDS. Compiled from Professor Harvey's Phycologia Britannica. 8vo. Price 5s. Lovell Reeve.

SEVEN years have now elapsed since the publication of Professor Harvey's "Phycologia Britannica," a work which has long been considered indispensable to all who desire information concerning the interesting group of plants which it professes to describe. But, owing to the care which has been bestowed upon its numerous and beautiful coloured illustrations, its price has necessarily been fixed at a rate which must have precluded many from becoming its purchasers.

Desirous of obviating this, and thereby introducing Dr. Harvey's work to a more numerous class of subscribers, Mr. Lovell Reeve has commenced the publication of "The Atlas of British Seaweeds," which is simply a reproduction of the plates of the Phycologia on a smaller scale.

The work of reduction has been, on the whole, well performed, although some of the figures, as that of Cystoseira fœniculacea, show the characteristics of the species represented less distinctly than they might have been.

To accompany the Atlas, an abstract of the text of the Phycologia has been published in a separate volume, under the title of the "Synopsis of British Seaweeds." To purchasers of the Atlas, this Synopsis will, of course, be indispensable, but we would also recommend it even to those who possess the "Phycologia." Its small size renders it a convenient pocket volume, and Dr. Harvey has given in the Appendix a new arrangement of the British Rhodospermiæ in accordance with the views of Professor Agardh, together with the titles of those Rhodosperms whose names have been altered.

Since the Phycologia was completed new species of British Algæ have been discovered, and an inventory of the latter is given at page 206 of the Synopsis. Descriptions and figures of most of these (by Professor Harvey) will be found in the present number of the Natural History Review.* To the same paper we would also refer the reader for a description of Elachista Grevilli, a new species not mentioned in the Synopsis.

The Atlas is being published in ten monthly parts, two of which have already appeared. When completed, its price (including the Synopsis) will be less than half that of the original work. J. R. G.

* Natural History Review, Vol. IV., 1857—Proceedings of Societies, page 201; plates xiv. and xv.

POPULAR HISTORY OF BRITISH CRUSTACEA. By Adam White, F.L.S., &c. Royal 16mo. Twenty Coloured Plates. By G. B. Sowerby. 358 pages. 10s. 6d. London. L. Reeve.

ONE of the most comprehensive of the many useful hand-books published in this series; short descriptions of four hundred species of crustacea being given, and figures, more or less characteristic, of ninety-six, some of them now figured for the first time. No pains have been spared to render this work as complete a manual as possible, and the author has, we must say, succeeded in laying before the student an almost complete picture of the crustacea of the seas around Britain and the Channel Islands. When we recollect that to this end he was compelled to wade through the natural history magazines and transactions for the past fifteen or twenty years, we can form some idea of the difficulties to be surmounted, and of the valuable time which such a book as this will save to the enquirer. The characters of the species are for the most part brief, but generally sufficiently diagnostic to enable us to identify any species. In one or two instances pleasant details of habits have been judiciously introduced. The number of new species here incorporated in the British lists are many, but time and want of means of comparison with published lists preclude our noticing more than a few. In the decapods we have, Scyllarius arctus, Alpheus affinis, Autonomea Olivii, Hippolyte fascigera, Grayana, Mitchelli, Whitei, Yarrellii, Barleei, and pusiola (as H. Andrewsii), Crangon Allmanni, Mysis Lamorna, productus, Oberon, and a new but unnamed species. Seven species of Diastylidæ are noticed, nearly all additional to the species in "Bell's British Crustacea." Among the Amphipods we find the following, which had escaped the notice of Spence Bate:—Opis typica, Anonyx elegans, Unciola irrorata, Amphithoe obtusata. Among the Entomostraca many additions will be found, but space forbids our noticing them. The only fault we have to find consists in what we must (in the majority of cases), look on as a needless change in the nomenclature generally adopted in this country, and although this has arisen from a rigorous adherence to the laws of priority, yet we cannot help thinking that such changes as Arctopsis for Pisa, Potamobius for Astacus, and, worse still, Astacus for Homarus, are extremely injudicious.

Very few would recognise under the names of Astacus Gammarus and Potamobius fluviatilis the Homaris vulgaris and Astacus fluviatilis of most modern authors; and surely the crayfish has as good a right to the name Astacus as the lobster. There are, in our mind, just as many injudicious changes among the specific names, but these we pass over. It is

more pleasant, however, to dwell on another, and as far as a *British* book is concerned, a somewhat novel character—viz., the frequent mention of, and reference to, Irish authorities and localities, this is as it ought to be, although in one or two cases there are inaccuracies on this head—for instance, M'Calla's discovery of Thia polita is here given to Dr. Scouler, and, under Munida bamfica, we are incorrectly informed—"It is common on the Irish coast." Yet, still, we must hail this as a step in the right direction. The usual inconvenient arrangement of the plates, which marks all this series, prevails here, but for this the author is not responsible. We think we cannot conclude better than by recommending this little book to any one studying the subject, its size and conciseness suiting it alike for the pocket and the sea-shore study, and though many additions will, doubtless, be annually made to our list, yet, for ordinary purposes, this book will be found a sufficient guide to the student for many a long day.

Popular History of the Aquarium. By George Brettingham Sowerby, F.L.S. 16mo. Twenty coloured Engravings. Price 10s. 6d. Lovell Reeve. London. 1857.

The Common Objects of the Sea Shore. By Rev. J. G. Wood, M.A., F.L.S. 12mo. Thirteen Plates, Coloured. Routledge and Co. London. 1857. Price 3s. 6d. Coloured; Plain, 1s.

Ocean Gardens. By H. Noel Humphreys. 12mo. Eight Coloured Plates. Sampson, Low, and Co. London. 1857. Price 6s.

River Gardens. By H. Noel Humphreys. 12mo. Twelve Coloured Plates. Sampson, Low, and Co. London. 1857. Price 6s.

To both Mr. Warrington and Mr. Gosse the credit of having discovered the Aquarium may fairly be given, and to the works of the last mentioned naturalist may be attributed the rapid spread of knowledge in connection with its improvement and more universal application, which has recently taken place. The charming volumes of this popular writer, together with Dr. Harvey's Sea Side book, and Mr. Kingsley's Glaucus, contain all necessary information concerning the history of marine animals which the student requires, save in the more recondite matters of detail, for which the various monographs and scientific journals must be consulted. But certain obscure and ill informed persons, observing the popularity which the above works had so deservedly obtained, and taking advantage of the ignorance of the public, on a subject almost entirely new, have lately taken

to publish books of their own, treating of the Aquarium ; a list of the more recent of which productions we have placed at the head of the present article. To Mr. Sowerby's volume we will first call the attention of our readers. The book is for the most part made up of quotations selected from the works of Bell, Baird, Forbes, Gosse, Harvey, Hugh Miller, Owen, and others whose names have appeared to the author sufficiently eminent to be deemed worthy of his patronage. At page 199 he tells us, when speaking of the Entomostracea, "that, having had but little opportunity of investigating these little creatures myself, this part of our book must take the character of a compilation, more completely than some of the others ;" and, accordingly, he proceeds to avail himself of Dr. Baird's work on these crustaceans. His opportunities of investigating in their native haunts the animals which he professes to describe would not appear to have been numerous. Frequent allusion is made to the marine animals at Mr. Lloyd's establishment, and, at page 209, Mr. Sowerby confesses that "the only opportunity I have had of observing a living specimen of the Entomostraceous division of crustaceans was that afforded me by the attendant at the Zoological Society's Fish-house." But though our author's journeys to the sea side are not very often performed, yet, when he does go there, it falls to his lot to observe phenomena very different from those which are commonly noticed. Acute and original powers of observation are, to a naturalist, desirable qualities, and these Mr. Sowerby possesses in a *very* eminent degree. Thus, in the first paragraph of the book, he informs us that "pebbles throw out their long arms, fringed with net work, in many a case, for food." A mere *observer* of facts, however, Mr. Sowerby is not. On more than one occasion the philosophic bent of his mind is shown by peculiar and ingenious interpretations of the observations made by others. Thus, after describing the habits of the hermit crab, he adds—"Might it not be that the zoe or tadpole form of some common species, produced where empty shells of different sorts and sizes lie strewn plentifully among pebbles and sand, falling into some of the hollows and becoming confined or liking the condition, remained in it through subsequent changes, and that thus what is first an accident becomes a habit." We presume that the above are some of the "original observations and opinions, many of which will be new to the reader," which the author promises in the preface.

At page 18 we are told that Acephala (Acalephæ ?) will not live well in confinement when full grown ; although some of them, in their early *hydroid* stages, are interesting. To what hydroid forms does Mr. Sowerby allude. Surely, if he has any notes of his own on those interesting "forms," he might

have made known some facts, which science is not yet in possession of; or is he aware what "hydroid forms" mean, and that the term "stages," as applied to such organisms, is incorrect, since no metamorphosis, strictly speaking, can be said to occur in these animals. In his account of Laomedea geniculata, he says that "this Zoophyte has the power of throwing off the polypi, or, rather, the little polypi are able to detach themselves and still to dance merrily in the water." He makes some quotations from Mr. Gosse, grievously, however, misrepresenting the statements of that naturalist, and then remarks that the polypes "resemble an inverted umbrella, with a nettled disk across its diameter; on the converse side is a central fleshy protuberance, forming the foot." We believe Mr. Sowerby when he informs us, in the preface, that his "personal observations of Hydroid Zoophytes are very limited." He here confounds the true polype heads of the Laomedea with the medusoids generated in the interior of the productive capsules. The former remain stationary at the top of the stalk on which they were placed, and are the organs by which the Zoophyte procures its nutriment; the latter are reproductive zoids rendered locomotive, whose functions is to produce ova, which may develope into the likeness of the parent Zoophyte. What Mr. Sowerby calls the "foot" is in reality the peduncle of the medusoid. But this is not all, for "Beroe ovata" is said to have "two very long pendent tentacles, to which are attached, at regular intervals, still more slender threads, which coil like the tendrils of a vine." The truth is that Beroe ovata has no tentacles whatsoever, and that Mr. Sowerby mistakes this ciliograde for Cydippe pomiformis.

The Zoophytes are described in an exceedingly confused manner, and a definition of these animals is taken from the old edition of Dr. Johnston's work, which is meant to include both Zoophytes and Polyzoa, "Eucratea chelata," Anguinaria spatulata," and "Cellularia ciliata" are placed by Mr. Sowerby among the Hydroid Zoophytes. At page 288 it is implied that Pyrosoma (one of the compound Tunicata) is a veritable fish.

Many of the animals described are totally unfit for preservation in the aquarium, being either very rare (in some cases not natives of the British islands), or else unsuited to live in confinement. Who would think of keeping a snapping turtle or a crocodile in one's drawing-room, to say nothing of Euplectella Aspergillium, which we would have to send for to the Philippine islands? or how we are to procure Pavonaria quadrangularis, Arachnactis albida, or Capnea sanguinea, one of which species has not yet been captured on our coast, perhaps, half a dozen times. Mr. Sowerby carries his zeal for rare animals so far as to describe Oculina prolifera, a

species which he himself goes on to say is rare on British coasts, and has not yet been taken in a living state. The aquarium is not, we submit, to be used as a receptacle for *dead* animals. Typographical (?) errors frequently occur, such as Luida for Luidia, Arachnitis for Arachnactis, Chrysoaria for Chrysaora, Acephala for Acalephæ, &c., &c. In many cases the headings of the chapters and sections do not correspond with the contents of the latter.

The figures, with one or two exceptions, are good, and constitute the only redeeming feature about this otherwise good-for-nothing book. It is not improbable that this work will meet with a better circulation than it deserves, owing to its introduction among the hitherto excellent series of popular Natural History works which Mr. Lovell Reeve has published. We make this observation, lest our readers, upon discovering the faults of Mr. Sowerby's volume, might take it for granted that other works, published in the same series and wearing externally the same appearance, are intrinsically of the same inferior quality. This, we are happy to say, is not the case.

"The Common Objects of the Sea Shore," by the Rev. J. G. Wood, M.A., F.L.S., is provided with engravings of Mr. Sowerby's execution. Mr. Wood had, however, sufficient good sense not to let Mr. Sowerby meddle with the text, and we may easily suppose that the work which he has produced is, on the whole, superior to that written by his accomplished draughtsman. Indeed, he does not scruple to differ with Mr. Sowerby on certain points—thus, at page 51, he alludes to "those strange amphibious humanities who persist in declaring that the hermit crab was the young of the common edible crab, etc." This is a sad hit at Mr. Sowerby's peculiar views concerning the true nature of that crustacean. Mr. Wood proposes to describe the common objects of the sea shore only; nevertheless, he selects, as an example of a pulmonigrade acaleph, what he calls Egeria. We take it for granted that the Æquorea is here meant, a genus so rare on the British shores that Professor Forbes met with no species of it until after he had published his monograph on the naked eyed Medusæ. The following lucid directions for the capture of the Acalephæ are given:—"If a vessel is filled with water, drawn from the surface of the sea on a calm day, there are generally a few Medusæ in it; but if there should be none, a little work with a gauze net will secure plenty." We would recommend Mr. Wood to procure Professor Forbes' monograph, from which he will derive much useful information.

The author is a clergyman, and, of course, writes with tolerable fluency; but he tells us nothing that is not far better told in other books. Errors, as we have seen, his work contains; but we will not stay to notice them, as we are desirous to make some observations on "Ocean Gardens," by Mr. Noel Humphreys.

This book is divided into nine chapters. Chap. I. is a sort of preface, written in a grandiloquent style, in which Mr. Humphreys tells us of the sublime aspects of the ocean, the sound of its deep, ceaseless voice, the eternal oncoming of its waves (we would remind Mr. Humphreys that the tide occasionally goes out), those voices in the wind which ought to excite strange sensations of admiration and curiosity and wonder. "But, no; to most of the idle crowd those sights and sounds are invisible and unheard. To appreciate nature as well as art, the mind requires a special education, without which the eye and the ear perceive but little of the miracles passing before them." After a few brief allusions to Socrates, Apuleus, and the Gymnosophists, Ray, Pulteney, Ellis, Linneus, Johnston, Harvey, John Edward Gray, Gosse, Forbes, and Gilbert White, Mr. Humphreys adds, "Through the fascinating interpretation of the good Gilbert, many now understand the attraction of those branches of natural history which he so curiously investigated; but few are willing to admit that it is as easy to make the natural features of some obscure fishing village prove equally interesting." Mr. Humphreys assures his readers that such is perfectly possible, and then proceeds, in the following chapters, to give the special education above alluded to, and to "lift the border of that dark green curtain which conceals the wonders of the ocean floor from vulgar eyes." His notion of a *class* is of a rather vicarious and uncertain character. The "compound" zoophytes are made into a *class* by Mr. Humphreys, but these, strange to say, include another *class*, the Pennatulidæ. The Lucernariadæ also constitute a *class;* and, at page 63, we are told that the sponges form a curious *class* of zoophytes, which have, perhaps, a much closer affinity to plants than any other class.

The author is in no way fettered by the ordinary views of naturalists. He tells us that "the functions of the flower-like set of organs with which the Holothuriadæ are provided are probably the same as those of the Nudibranch *class* of Mollusks, which, though generally considered as being a breathing apparatus, are, probably, at the same time, food-collecting organs, as all the creatures thus furnished are liquid feeders." Often as Mr. Humphreys quotes the works of Gosse, he seems to have failed to notice the passages in which the voracity of the Nudibranchs in devouring

zoophytes, etc. (which certainly cannot be regarded as liquid food), is spoken of.

With a few exceptions, the names of none of the animals mentioned are properly spelt. Thus, we have Geniaster for Goniaster, Dunicata for Tunicata, Gastrophæna for Gastrochæna, Paguras for Pagurus, to say nothing of Sepia vulgaris for Sepiola vulgaris, Egines punctiluceus for Egirus punctilucens, with a host of others. "Stars of the *class* Luidia" are called brittle stars, so that the student is led to suppose that this Echinoderm belongs to the Ophiuridæ. The Aplysia is described among the Nudibranchs and the Chiton is said to be a sort of sea woodlouse. The figures with which the work is illustrated are showy, but are executed, in general, without much regard to accuracy.

The author takes a high stand upon a mound of his own erection, and frequently denounces therefrom the "superficial knowledge," "imperfect observations," which have become so injurious to science, and deplores the state of "Egyptian darkness" in which so many are involved. Shakspeare is held up as a deplorable example of an intellectual giant who could *not* see nature, and two mistakes in the expression, "eyeless venomed worm," are pointed out.

Now, though we can show that three mistakes are here made (one of which, and that the most striking, has escaped Mr. Humphreys), yet we still think that Shakspeare *could* see nature a great deal better than Mr. Humphreys, and those who have read Mr. Patterson's delightful little book on the "Insects mentioned in Shakspeare's plays" will, probably, think the same.

Mr. Humphreys concludes his work with a sublime apostrophe on the possibility of a gigantic aquarium—"It only remained to the ancients to have exhibited a Titanic Aquarium to render our triumph over their labours in the field of popular natural history impossible. Had but a Roman Warrington or Gosse, &c., adopted the germ of such an idea, and an Osler existed to furnish the glass, the Pompey, or Cæsar, or Crassus would not have been wanting to feast the eyes both of patrician and plebeian Rome, with an aquarium measuring hundreds of feet in length, in which the monsters of the deep would have been exhibited in deadly conflict, and human divers, armed with net and trident, like the retiariæ of their gladiatorial combats, would have encountered beneath the waters the shark, the whale, or the torpedo, to the shouts of crowded circuses, the centre of which would have been a glass-walled aquarium. But a gigantic aquarium is, fortunately, a feat that yet remains for modern science to achieve, and

which it will, doubtless, accomplish. The day shall arrive when we shall see the living behemoth—the Titan of the deep—rolling majestic in waves of his native element, perhaps pursued by his cruel enemy the sword-fish, or harried by a shoal of herrings, graphically exemplifying to a London crowd the origin of Yarmouth bloaters; or we may see the dreaded shark float round and round the vast glass prison seeking his prey, and the shark hunter of the South Seas may be imported to exhibit his skill in a bloodless conflict—mocking the attempts of the sea monster to seize him, as the Spanish matador plays long with the infuriated bull, but without necessitating the same catastrophe to the animal, defenceless against the specially trained skill of his human antagonist. We have already had our crystal palaces, covering their acres, and filled with objects of art and wealth from every quarter of the globe; it is not impossible, therefore, that we may have crystal-walled seas, in which aquatic menageries will form the last new object of fashion and wonder."

After this display of Mr. Humphrey's powers as a writer, any lengthened notice of his other work, that on "River Gardens," must appear unnecessary. Like its companion volume, it abounds with erroneous notions and unscientific explanations of vital phenomena. This, however, is the less to be wondered at, for no good book has yet been written on the fresh water aquarium.

Thus are the beautiful lessons which the study of nature unfolds misinterpreted by those who are incapable of understanding them, and the writings of really painstaking and observing naturalists made to furnish information to greedy and ignorant compilers. But we live in expectation of better times, when such spoilers will cease to be encouraged in their evil ways, and science reap many fruits from the application of the beautiful principle on which the adjustment between animal and vegetable life is known to depend.

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LIST OF

Scientific Periodicals, Transactions of Societies, &c.,

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GREAT BRITAIN.

I. Zoologist. A Popular Monthly Magazine of Natural History. Published monthly. London. J. Van Voorst.

II. Phytologist. A Botanical Journal. New Series. Published monthly. London. W. Pamplin.

III. Hooker's Journal of Botany. Published monthly. London. Lovell Reeve.

IV. Naturalist. A Popular Monthly Magazine of Natural History. London. Groombridge and Son.

V. Liverpool Natural History and Philosophical Society, Journal of. Published annually.

VI. Edinburgh New Philosophical Journal. New Series. Published quarterly. Edinburgh. A. and C. Black.

VII. Dublin Quarterly Journal of Medical and the Collateral Sciences. Published quarterly. Dublin. Hodges, Smith, & Co.

VIII. Journal of the Royal Society of Dublin. Published quarterly. Dublin. Hodges, Smith, and Co.

FOREIGN.

IX. Canadian Naturalist and Geologist.

X. Proceedings of the Boston Society of Natural History.

XI. Proceedings of the Academy of Natural Sciences of Philadelphia.

XII. Archiv fuer wissenschaftliche Kunde von Russland.

XIII. Nyt Magazin for Naturvidenskaberne. Af den physiographische Forening i Christiania.

XIV. Allgemeine deutsche naturhistorische Zeitung; im Auftrag der Gesellschaft Isis in Dresden; neue Folge.

XV. Abhandlungen des Zoologisch-mineralogischen Vereines in Regensburg.

XVI. Korrespondenz-Blatt des Zoologisch-mineralogischen Vereines in Regensburg.

XVII. Abhandlungen der Senckenbergischen naturforschenden Gesellschaft in Frankfurt.

XVIII. Jahrbuecher des Vereins fuer Naturkunde im Herzogthum Nassau.

XIX. Wuerttembergische naturwissenschaftliche Jahreshefte.

XX. Jahrbuch der K. K. Geologischen Reichsanstalt.

XXI. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, in Wien.

XXII. Tageblatt der 32sten Versammlung deutscher Naturforscher und Aerzte, in Wien, im Jahre 1856.

XXIII. Lotos: Zeitschrift fuer Naturwissenschaften.

XXIV. Naumannia: Journal fuer die Ornithologie, vorzugsweise Europas. Organ der Deutschen Ornithologen-Gesellschaft. Von E. Baldamus.

XXV. Flora. Allgemeine Botanische Zeitung: herausg. v. d. K. Bayerschen Botanischen Gesellschaft zu Regensburg. Redigirt von Dr. A. E. Furnrohr.

XXVI. Zeitschrift fuer Entomologie herausgegeben von dem Verein fuer Schlesiche Insektenkunde zu Breslau.

XXVII. Neueste Schriften der naturforschenden Gesellschaft in Danzig.

XXVIII. Abhandlungen der Naturforschenden Gesellschaft zu Halle.

XXIX. Entomologische Zeitung: herausgegeben von dem Entomologischen Vereine zu Stettin.

XXX. Verhandlungen des naturhistorischen Vereines der Preussischen Rheinlande und Westphalens.

XXXI. Handelingen der Nederlandsche Entomologische Vereeniging.

XXXII. Bouwstoffen voor eene Fauna van Nederland: bijeenverzameld door Dr. J. A. Herklots.

XXXIII. Nederlandsche Insecten: door C. en J. C. Sepp. Voortgezett door Dr. Snellen van Vollenhoven.

XXXIV. Bulletin de l'Academie Royale des Sciences, etc., de Belgique.

XXXV. Memoires de la Société Royale des Sciences de Liége.

XXXVI. Memoires de la Société Imperiale des Sciences, etc., de Lille; Seconde Série.

XXXVII. Memoires de la Société du Museum d'Histoire Naturelle de Strasbourg.

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THE NATURAL HISTORY REVIEW.

Proceedings of Societies.

DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

FRIDAY EVENING, NOVEMBER 21, 1856.

R. Ball, LL.D., President, in the Chair.

This being the first meeting of the Session, the President read his

ANNUAL ADDRESS.

When on Saturday last your Council told me it was my duty to address you, it came on me quite by surprise: it seemed but as yesterday that I had done so; time passes so quickly to those who are fully employed. Yet it is certainly a fact that a year has glided away—I trust not without advantage to many of us—and that we shall have in this Association proof that good work has been done in the period, and that not a few of you have been active in the pursuit of practical zoology, in some of the departments to which I ventured to call your attention last year.

In noticing the occurrences of the past year, I have not to mourn the loss of so many of our members and friends as on the former occasion; yet there is one loss which I deeply feel, that of my old and excellent friend Yarrell, one of our Corresponding Members, whose kindness and hospitality I often enjoyed. Eager to obtain information himself, he was equally willing to give it. I may mention, as an instance, that he placed at my disposal, during two days which I spent in his house, all the materials in his possession which he thought could aid me in a work on Fisheries, in which I had made considerable progress, but which pressure of business and illness forced me to lay aside—I hope not for ever.

Since our Association was established (now but a brief period), we have had a great loss of most valued members, men who loved natural science for its own sake, and to whose exertions it mainly owes its present rising position; by being frequently associated with them, their loss occasions in me a sense of loneliness which our junior members cannot yet and probably will never know,—for this loss is likely to be replaced by additions, from the numbers of persons now enlisting in the pursuit of natural science. We must hope that the great majority of these

recruits will be equally truth-loving and pure-minded with those for whose loss we grieve; but it is reasonable to fear that some few may be led into the ranks in pursuit of the rewards and distinctions of which the service now appears to hold out a promise. It is right to distinguish between these classes. The former, in seeking to elevate themselves, will endeavour to carry up with them all their truth-loving brother workers. The latter will essay to be uppermost, by depressing and depreciating all, but particularly those who do best and most truthful service. A modern author has something allied to this feeling when he says:—"The profoundly wise do not declaim against superficial knowledge in others so much as the profoundly ignorant; on the contrary, they would rather assist it with their advice than overwhelm it with their contempt, for they know that there was a period when even a Bacon or a Newton was superficial, and that he who has a little knowledge is far more likely to get more than he that has none." Therefore, all you who have knowledge, give of it freely to those who ask, and you who have not knowledge, be not afraid to seek it where it may be found. No one ever left our late friend Yarrell, feeling shame that he had asked him a foolish question, but, on the contrary, feeling pleasure that he had been kindly set right.

It is a matter for congratulation that during the past year the Association had no want of interesting business for each evening meeting. Knowing that in older societies difficulty is often felt to provide the necessary intellectual entertainment, we must take the fact I have stated as an evidence that such an Association as ours is not superfluous. Having now, with the kind approval of the Provost and Board (whose patronage we have always enjoyed), united botany to our former pursuit of the kindred science, zoology, I cannot but look forward to a great increase of interest in our meetings. We shall have our learned and most excellent Vice-President to give us the aid of his great knowledge; we shall hope occasionally for some of the fruits of his adventurous travels; and we shall have displays of living exotics, of the rarest character, through the kindness of Mr. Bain, the Director of the University Gardens. While I look forward to a large increase of zoological contributions consequent on the increase of our Association, for myself I hope to bring before you, as they may be developed, the zoological collections made by Professor Harvey, when, no doubt, he will add interest to them, by details of how they were procured.

To-night Professor Harvey favours us with some remarks on the inhabitants of the Fejee Islands, whose arms, &c., you see hung around the room. Collections of this kind have been sneered at, but very improperly, as a right knowledge of them is of great importance in that very difficult and very high study, ethnology, a study in which the utmost penetration of the zoologist should join with the most profound knowledge of the philologist, as races of men are not less distinguished by their physical form and language than by their arms and ornaments: these things come to have a scientific use.

[Here follows a recapitulation of the principal original communications to the Association during the past Session (with other matter of

local interest), which we omit, as they have already appeared, mostly at full length, in the preceding volumes of this Journal.]

The worthy President of the Linnæan Society, my friend Professor Bell, in an introductory lecture recently given at Guy's Hospital, has so fully illustrated the necessity which exists for some intellectual resource beyond the ordinary occupation of a man's life, that I venture to borrow the passage from him, rather than to attempt to clothe his ideas in my own words. I may remark that he furnishes in himself an admirable example of what he urges, and when he retires from his laborious practice, finds in his retreat at Selborne (the Selborne of Gilbert White) refreshment in the difficult zoological subjects which he so ably pursues:—

"Every one who has experienced the *tædium vitæ*, the harass and fatigue of spirit arising from the close application of the mental powers, for any lengthened time, to one absorbing and anxious object, must have felt the craving of the mind for some new occupation, which, by a healthful change in the direction of the intellectual force, might relieve the fatigue and weariness of the over-wrought and over-excited sensorium. This relief is not always to be obtained by abstract rest.

"The mere cessation of exertion does not satisfy or fill the void created by long and tiring labour on one exclusive subject. As when the eye has long been gazing upon any object of a bright and intense colour, the greatest relief that can be afforded to it is its resting, not in darkness, but in some material of a hue complementary to that by which it has been fatigued.

"Again, when from illness, distress, or any other disqualification, the laborious man of business, or the diligent student, is incapacitated for his accustomed pursuits, how depressing are the languor and inanity which attend him on his retirement, unless he has some intellectual resource upon which to exercise his otherwise inert and useless powers. Accustomed to active exertion, and possibly to experimental or abstruse investigation in his ordinary avocation, if he be deprived of these, and no substitute presents itself to take their place, the mind becomes wearied and depressed, from the very absence of healthful exercise and employment. And if, still further, through professional success, or from any other source, the approach of age finds him retiring from his wonted stirring occupation, and hoping, after a life spent in the exercise of active duties, to enjoy the blessings of a competency in that rest from his labours which, to a mind well regulated and stored with intellectual resources, constitutes the height of earthly enjoyment, and a precious auxiliary means of preparation for the great change to which he is hastening,—if there be no such store of intellectual treasure, no pursuit in literature, or science, or philosophy, to occupy the leisure days and years that remain to him, how listless, at the best, and, too often, how full of misery, is the interval allotted to him between the cessation of his active employment and the end of his earthly career! These considerations have, at times, forced themselves upon me so powerfully, that I have, without hesitation, embraced the present opportunity of showing how important it is to provide, by some extra-professional pursuit—whether literary or scientific—a rational and intellectual amusement, and relaxation to the intervals of business,—solace in time of illness or distress, and an unfailing resource in retirement, after the ordinary duties and avocations of life are over."

Mr. Bell goes on to quote several instances of men who, having amassed wealth in business, have retired to what they supposed rest, and found it not; he tells us of some who even committed suicide, and of others who returned to perform gratuitously the duties of the vocation in which they had been brought up.

I may add, that it is from hard-working men that good extra scientific work is generally to be obtained; the man of leisure lacks energy

and method, and but rarely does much; did he know how to be happy, he would take up some scientific pursuit.

Professor Bell quotes Bacon, who says, "the most active and busy men that hath been, or can be, hath, no question, many vacant times of leisure." How should these times be passed? Professor Bell goes on to show to what advantage they may be employed by the divine, the physician, and the lawyer, and has given excellent examples.

During our recess I have received several communications on subjects of natural history. A letter from our member, the Hon. G. S. Gough, mentions, that his cousin, Mr. Percy Gough, shot a *Pastor roseus* at Rathronan on the 27th of July last, and he wishes me, as I now do, to communicate the fact to the Association.

Mr. Robert Hime, of Ballydonaren House, presented to the Museum the fine specimen now on the table, shot in July in Wicklow; and Mr. Bridgford, the eminent horticulturist, told me that he shot one near Dublin about the same time.

To show you that it is not necessary to be technical to write intelligibly on natural history subjects, I will read an extract of a letter from Mr. R. Taylor of Kenmare:—

"I would beg to inquire what may be the name of a bird now before me, of which the following, though an unscientific description, may, perhaps, be sufficiently distinguishing. It is in size and shape like the common wild duck, except that it is something smaller, the neck something shorter in proportion, and the breast rather flatter. It has no brightness or beautiful colour whatever in any part of its plumage, which may, perhaps, properly be compared to the colour of whalebone; darkest on the upper part of the head, brighter on the back, and lightest on the under parts of the bird; on the breast intermingled with dirty white. Its bill is that of the duck kind in form, its colour a heavy black, but having two rows of remarkable serratures on each side of each mandible. On the underneath part of the lower mandible is a depressed mark of an arrow-head. The tongue seems formed of two distinct and widely separated muscles, the skin covering hardening towards the tip, and projecting thence, thin, flat, and sharp. The tail is short and pointed. The legs are flatter than those of any of the duck kind that I have observed, the better adapted for passing through the water; and the feet, when used in passing forward, fold much flatter. It has a small toe behind, webbed, like the seed of a plant. The colour of the legs are yellowish black, the claws are most yellow between the joints, and the webbing of the foot is black.

"It was shot on the sea; muscles were found in its throat; how it had got these out of the shells appeared surprising.

"Should you not have seen this or other rare birds here, which, with your permission, I would describe, it would stimulate me to use my best exertions to procure specimens."

In this he clearly expresses his meaning, and there can be no difficulty in identifying his bird as a black scoter duck.

In my Address last year I spoke of a large number of subjects, and though I did not exhaust any one of them, it would be rather tautological to go over the same ground. I must, therefore, refer our young members to the notes of this Address in the first Number of the "Natural History Review" for this current year (Proceedings, vol. iii., p. 1, &c.), with a view that they may be informed of the constitution, objects, and advantages of our Association. In mentioning the "Natural History Review," the organ of the Association, edited by some of its officers, I may state, that they have opened communication, and exchange publica-

tions, with the Imperial Academy of Sciences of Vienna; the Imperial Geological Institute; the Zoological and Botanical Association of Vienna; the Lotos, Natural History Society of Prague; the Royal Belgian Academy of Science; the Scientific Society of Liége; the Society of Sciences and Arts of Lille; the Natural History Societies of Wirtemberg, of Nassau, of Dresden, of Dantzig, of Westphalia, and the Rhenish provinces; the German Ornithological Society; the Entomological Association of Stettin; the Entomological Society of Silesia; the Zoological and Mineralogical Association of Ratisbon; the Natural History Association of Christiania; the Editors of the Archives of Science in Russia; and the Imperial Society of Naturalists of Moskau. The desire expressed in a recent letter of the Director of this last, Dr. Renard, Imperial Councillor of State, for a very active literary intercourse between that Society and your Association, will, doubtless, be received with gratification, and readily reciprocated on our part.

I would further mention, that we contemplate having some meetings specially for microscopical purposes; these will, as we expect, not only prove very interesting, but much will be gained in instruction, in the example of microscopic manipulation, in comparison of instruments, and other advantages so obvious, that I do not feel it necessary to dwell on them, or to detain you further from Dr. Harvey's communication.

Professor Harvey, Vice-President, then read some notes on the—

FEJEE ISLANDS AND THEIR INHABITANTS.

The vegetation is, of course, quite tropical in its type: the cocoa-nut palm, the banana, and the breadfruit tree, with abundance of tree ferns, giving a character to the landscape. Ground ferns are also abundant, and the forest trees are frequently covered with Epiphytes, both orchids and ferns. A climbing species of Pothos (one of the Arum family), is also a very conspicuous ornament to the trees. Except on the very small islands, *the forest* is not continuous; but the plains and hills are either covered with grass or small bushes, or dotted with scattered trees. Here and there patches of dense wood are seen; and generally the sides of the mountains are clothed with trees. Almost every gulley has its stream, along the banks of which the tree ferns abound. They are so common that the natives usually build their houses with the trunks, as being more easily obtained than those of hardwood trees. Some of the smaller islands are covered with forest, and uninhabited, but resorted to by the natives for the purpose of cutting timber for their canoes, which (like those of all the Pacific Islands) are made from the hollowed trunks. The native timbers are of many kinds, some extremely hard and heavy,—as in those of which the clubs are made. A species of Casuarina furnishes the best club wood. There are two native pine trees (a Dammara and an Araucaria), but neither appears to be much in use.

The yam is grown in dry ground, generally on hill sides. It requires a good deep soil, which must be well dug, and kept free of

weeds during the growth of the crop. The root, when carefully cultivated, grows to 18 inches, or 2 feet in length, and weighs 10 to 20 or 30 lbs., or more. In shape and aspect it resembles a mangel wurzel, but in its farinaceous property and taste it is more like the potatoe, though botanically it is far removed from that plant. Yams are, perhaps, more watery than the potatoe, but, if well baked, become dry, and are quite as well tasted as ordinary potatoes. The Feejee yams are, however, inferior to those grown in the Tonga groups, which may be owing to difference of soil.

The *sweet potato* (as the edible root of a species of convolvulus is termed) is grown occasionally, but does not constitute a staple crop. Two kinds of arrow-root abound in the plains, and their roots are collected by the natives, but I did not see them cultivated in gardens.

Almost every house has its patch of bananas, of which they cultivate several varieties. These fruits are a very important element in the food of the people, and are eaten both raw and roasted, or variously dressed. The *sugar cane* is seen in a few places, and might be cultivated to any extent. The *breadfruit tree* abounds, but its fruit was not in season during my visit.

The cocoa-nut, which is generally so abundant on the shores of all tropical islands of both hemispheres, does not seem to flourish in Feejee, or at least is only abundant on some of the islands. In the neighbourhood of Bau cocoa-nuts are so scarce that they are *Tabu* to the common people, being kept for the use of the chiefs. At Lakemba they abound, and the natives manufacture a considerable quantity of oil. Where the cocoa palm grows, its nuts, used when about half ripe, furnish the luxuries of puddings and drinks; and the husks supply fibre, of which the natives make their very neatly plaited ropes. At dinner the milk of the cocoa-nut is generally drunk hot, and the dessert closed by a cold nut.

The great luxury of the islands, in the way of drink, however, is derived from the *Piper methysticum*, a specimen of which is on the table. This is a large growing, shrubby *pepper*, which the Feejeeans call *Yangona*, but which is elsewhere more commonly known under the name *Kava*, or Ava. It is universally cultivated, and, on approaching a chief, it is usual formally to present him with a piece. The method of preparing a drink from this root has been often described.

[Professor Harvey next gave an account of the coral reefs and the fisheries carried on about them, the navigation and harbours, the foreign colonies settled in the islands, the state of the native population, their government, ideas of religion, and superstitious practices.]

At Bau there was a celebrated large temple, before which, by the command of its priests, many thousand victims have been killed and eaten. As many as a hundred bodies were sometimes cooked at a single feast. There is a stone in front of the temple against which the victim's brains were generally dashed out as a *coup de grace*, before going to the oven. It was described to me as being, in old times, rarely seen free from blood or brains; but when I visited it, it was overgrown with weeds, as heathenism no longer exists at Bau. The great temple itself

has disappeared, with the exception of a double row of large upright stones, like those of Stonehenge, which define the sacred mound on which it stood. The ground in the centre is now converted into a burial place for strangers, and all feeling of *sanctity* appears to have passed away, not only from this, but from all the other temples,—those that remain being used as dwelling-houses. It is remarkable, indeed, how instantaneously the change from reverence to profanation takes place at Feejee. A man will sell, for a couple of yards of calico, the sacred vessels or images of a temple, which, up to the previous day, he would probably have defended with his life, and certainly would not have profaned for any consideration. So, too, with respect to cannibalism. The last feast that took place in Bau occurred only *ten days* before the chief or king, with 300 of his people, renounced heathenism. At this feast many bodies were eaten, and it presented all the usual atrocities of old times. It seemed to be a sort of *farewell* jollification, as well as a farewell offering to the gods,—for all these temple feasts bear something of the character of a religious observance.

I heard many stories of atrocities connected with cannibalism, but they were not of very recent date; it must not, however, be supposed that cannibalism has ceased. On the contrary, it still prevails, and is likely to continue, wherever it has not been overthrown by Christianity. Whilst I was at Nandy, in Vanna Leon, two instances occurred close to the mission-house. I did not witness the fact, but the missionary (according to his usual custom), went to the place to reason with the natives, and to persuade them to give up the bodies for burial. In one case he was partially successful, the *remains* of the feast having been given up; but in the other the savages laughed him to scorn, and continued eating the flesh in his presence. It is rarely, however, that a Feejeean will be guilty of such rudeness. He knows our detestation of the practice of eating human flesh, and he generally humours it by indulging in private. You would not suppose that the polite, jocose, and, perhaps, hospitable native you were conversing with was a murderer and man-eater, but it is often so. I paid a visit to Tui Wainunu, the principal chief over a large district, and who is a noted cannibal, of whom most appalling stories are told. I was anxious to procure specimens of a tree which was only found on his property, and for this purpose paid him a visit. I went with the captain in the ship's barge, the distance from where we were lying at anchor being about twelve miles. We found this petty prince residing in a large, well-built house, which may have been 60 feet long by 30 wide, and was fully 30 feet high. It consisted of a single apartment, but one end was shaded off with mats as a sleeping-place. There was a suspended platform or loft, where his store of cloth, &c., was kept. The cooking-place, well formed with stones, was at one end, and at the other mats were spread, where the chief and his family, and his guests, were seated. The humble retainers crouched round the walls in the farther extremity. Behind where the chief sat, was a row of some fifteen well-cleaned muskets, of which he seemed proud, for, on our departure, he fired some of them as

a salute. I approached him with a present of a hatchet and a large butcher's knife, and the captain, who accompanied me, made a similar offering. We then explained our business through an interpreter, and he sent a pair of his gillies with me to find the trees. On my return I found that dinner was served. To the captain and me taro-root and water merely were supplied; but something was brought to the chief out of a pot cooking on the fire. I thought, perhaps, it might be *broth of abominable things*, and was not sorry that none was offered to us. The chief's reception of us was most polite. To us he appeared most kind and amiable, and when returning to the boat he helped to carry my specimens, and seemed much amused with what I had been gathering. He is a very fine-looking man, upwards of six feet high, and very well proportioned, with powerful display of muscular strength. Except a very small piece of cloth passed between his legs, he was quite naked. He seemed to keep his people in great subjection. Whilst we were there some petitioners came in, who humbly offered a gift, I suppose asking a favour. It did not seem quite to please him, for he got up, walked rapidly over the room and back again, slapping his thighs, and at the same time uttering his orders in a loud tone. When thus excited, and freely moving his limbs, he certainly had a most commanding presence. I heard many stories of his doings, some showing great daring, and others great cruelty. I will only mention one, which appeared to me particularly cold-blooded and ferocious.

He had, in one of his forays, taken a village where many were killed, and, of course, eaten; only one little girl, of about twelve years old, was spared, but brought away as a captive. This child lived for several months in his house, playing with his children, and treated like one of them. But at last, when he was going to pay a visit to a neighbouring chief, he took this little girl in the canoe. Nothing passed till they came near where they were to land, then, at a word or sign, the girl was clubbed, her body taken on shore, and served the party and their friends who joined them as the dainty dish of the pic-nic. The fact of the poor little girl having lived on familiar terms in the house for such a length of time, stamps her murder with peculiar atrocity, and I own that, when I shook hands in parting with my polite entertainer, I did not feel very amiably towards him. Much allowance must, however, be made for custom. To the untaught Feejeean human life has no sanctity. It is no greater crime in his eyes to kill a man for food, than it would be in ours to kill an ox or a sheep.

On the occurrence of the death of a chief it is customary to strangle his women, often to the number, if he be a *Turanga Leon*, or noble, of some ten to twenty. The duty is always undertaken by the next of kin, the privilege belonging of right to the women's own children, who generally perform the ceremony with the greatest coolness. The victims are gaily dressed out, and the people collect from all parts to witness the ceremony, and to admire. Some of the widows show a desire for death, and almost all affect the wish to follow their lord and master to the world of spirits. Occasionally a recusant occurs, but her prayers

are disregarded, and she is looked upon as a disgraced person. The missionaries have been at great pains to abolish this custom, but have encountered much opposition. Even if the successor of the deceased chief be disposed to acquiesce, his people, and often the brothers and sisters of the women, interfere to require this compliance with the customs of the country. It is thought to be a dishonouring of the dead, if companions be not sent with him to the grave. When the late king of Bau died, it was thought a great condescension to missionary prejudices that only five of his fifteen wives were put to death. Mr. Calvert, the missionary, interfered during the ceremony, and by his intercession alone were the lives of the ten others saved. This was considered a great victory over native customs, for similar intercession, even when backed by the influence of captains of our vessels of war, had, on many previous occasions, failed. Sometimes a woman of very high rank escapes, because there is no person present who is of sufficient rank to act as executioner. I saw a Queen Dowager of Rewa, who had escaped for this reason. None of the surviving relations were near enough to the throne to authorize them in strangling her. It is only as the chiefs become converts to Christianity, that this custom—which has more hold on the popular mind than cannibalism itself—is given up.

Propitiatory sacrifices of children are also, by the heathen Feejeeans, frequently made to the gods,—particularly in cases of the illness of great chiefs. The children are sometimes buried alive. Cutting and maiming their bodies, as evidence of grief, is also common. The practice of cutting off the two upper joints of the little finger, on occasion of the death of a relative, is so common, that you rarely meet with a Feejeean who has not lost at least the little finger of one hand. When the late king of Somo Somo died, above an hundred fingers were cut off, and an eye-witness counted seventy of them stuck in a split reed, and thrust into the thatch of the house over the doorway.

Ethnologists class the Feejeeans with the *Papuan* race, or that family of mankind that has spread over New Guinea and several neighbouring islands. It is obviously akin to the Australian, though superior to that most degraded people. Dr. Ball will, I hope, state to you what peculiarities are exhibited by a pair of skulls which I procured. I do not know their history; they were brought to me for sale the day we left the islands.

The Feejeeans are of moderate stature, and of a very dark brown or blackish colour; but some are pale, and such are called *damu-damu*, or red, by their blacker countrymen. There is much more variety of feature than we usually find in an unmixed and uncivilized race. Some have the thick lips, broad nostrils, depressed noses, and high cheek-bones properly characteristic of the Nigrite type; and others have straight or even hooked noses, and lips not thicker than those of Caucasians. Some of the men and women of rank are very handsome, with good foreheads, and well-opened, expressive, black eyes. The face, indeed, admits of a great display of expression. But there is great difference in physical development between the chiefs and the common

people. The former are generally men of stature, often six feet in height, and proportionably muscular; the latter, in general slightly made, and not more than five feet ten inches in height. The beard is black, and frequently copious. The hair also black, or dark and frizzled, but not woolly. It is worn in a variety of fashions. If a Feejeean be a dandy in anything, it is in the dressing of his head. There is a regular guild of barbers, who dress hair professionally; and this operation is as lengthy and important as it was in the days of our great grandmothers. The most usual fashion of wearing the hair is to comb the locks straight out from the head, each lock, stiffened with some oily matter, being frequently separately twisted. Thus the head appears about thrice its proper diameter. Over the hair so dressed is commonly thrown a piece of very fine white bark cloth, called a *sala*. This has the effect of a turban, and certainly improves the appearance, besides protecting the precious work of the barber from disarrangement. Frequently, several of the locks behind the ear are plaited, and hang down like tassels on the neck. Sometimes I have seen one side of the head cropped close, whilst at the other the hair was allowed to grow into a great bush. These were very *fast men*, apparently, who wore it in this fashion. Sometimes, instead of the *sala*, head-dresses of leaves and flowers are worn, especially by the young ladies. I remember, in one of my rambles, encountering a merry party of young girls with head-dresses made of torn and crumpled leaves and flowers, very tastefully arranged. The same parties had their ears bored, and the hole distended by large rolls of leaves stuck in.

The sleeping-place is commonly separated by curtains formed of mats. The beds are also of matting. But a wooden pillow is a necessary part of the furniture. It is so contrived that the head, or rather the neck, may rest on it without disarranging the elaborately dressed hair.

Manufactures of several kinds exist in different parts of the islands, and specimens will now be exhibited of the native pottery, native cloth, basket-work, &c. [Specimens of warlike implements, spears, war clubs, hunting or birding clubs, &c., all elaborately carved, were hung round the room.] It is surprising to think that most of these clubs and spears were carved with implements no better than stone hatchets and chisels, bits of shell, and such like rude tools. The natives are now well supplied with European hatchets and knives; and but few clubs are made. In fact, these weapons have ceased to be valuable in native eyes, since Europeans have made them acquainted with the use of fire-arms. In a very few years neither club nor spear will be found in Feejee, for, even though they may not be beaten into ploughshares and pruning-hooks, they will certainly be supplanted by rifles and revolvers. These implements of a rude people have, therefore, their interest, and ought to find a place in our Museum, which is designed to exhibit in epitome something illustrative of the history of the various races of men. It is curious, too, to observe how similar patterns are reproduced in different ages of the world and by the most distant peoples. Thus, one of the lamps on the table might have been dug from an ancient Roman tumulus. Yet, what con-

nexion is there between the early inhabitants of Italy, and those island savages of whom we have been speaking? The reply is obvious: there is just the connexion of a common origin of all mankind, and these coincidences serve to remind us that of one blood all mankind were made, and that all the varieties of our race make up but one species. If one family be raised higher than another in civilization and knowledge, yet all are capable of being raised, as of being depressed, in the scale. We of the white race must not pride ourselves on our superior attainments, for our advantages have been immeasurably greater. We have been planted on the sunny side of the hedge. Rather let our fortunate lot impress on us the desire of extending the blessings of civilization and true religion to these dark heathens; and let us not withhold our sympathy and assistance from those devoted men who have planted the banner of the Cross in the Feejeean Archipelago. It is now twenty-two years since Christian missionaries set foot in Feejee. During the first fifteen years of the mission scarcely any progress was made. But the spirit of faith and love persevered, until at last victory appears on the side of truth. During the last few years rapid progress has been making, and when I left the Archipelago this time twelve months, there were nearly 30,000 natives of all grades receiving instruction, and everything bore promise of a still more abundant success.

At the conclusion of this paper various objects, natural and artificial, exhibited for its illustration, afforded matter for conversation which occupied the rest of the evening.

The Secretary then announced, that at a meeting of the Council held the 14th November, it had been proposed by Professor Harvey, that the name of this Association should be changed from that of "Dublin University Zoological Association" to that of "Dublin University Zoological and Botanical Association." This change had been approved of by the Board of Trinity College. The introduction of Botany, it was hoped, would add a great deal of interest in future to the meetings of the Association.

The Members then proceeded to ballot, when the following gentlemen were elected:—As Honorary Member, W. Stokes, M.D. As Ordinary Members:—I. Bond; W. B. Brownrigg, *sch.*; J. W. Warren, *sch.*; P. C. Smyley; R. Daniel, M.B.; R. F. M'Dermott, M.B., all of Trinity College.

FRIDAY EVENING, DECEMBER 19, 1856.

Robert Ball, LL.D., President, in the Chair.

The Minutes of the last General Meeting having been read, were agreed to, and signed by the Chairman.

Mr. E. Percival Wright acknowledged the receipt of the following books:—

"Nereis Boreali-Americana." By W. H. Harvey, M.D., V.P. Parts I and II. 4to, coloured plates. From the author.

"Encyclopédie d'Histoire Naturelle," &c. Par Le Dr. Chenu. "Coléopteres et Papillons." Royal 8vo, 2 vols., bound in one. From A. H. Haliday, A.M., V.P.

"Manual of Mollusca." By S. P. Woodward. "The Supplement." From W. R. Tagart, Esq., Hon. Sec.

"Entomologist's Annual for 1857." With coloured plates. Edited by H. T. Stainton. From the Editor.

"Natural History Review for 1856." Vol. III. From the Editors.

"Proceedings of the Academy of Natural Science of Philadelphia." Vol. VIII., Nos. 1 and 2. And, "A Notice of the Origin, Progress, and Present Condition of the Academy." By Dr. W. S. W. Ruschenberger. 1852. From the Academy.

"Proceedings of the Boston Society of Natural History." Vol. V., Nos. 12 to 21. May, 1855, to April, 1856. From the Society.

A. H. Haliday then read the following Paper from W. Smith, F.L.S., Professor of Nat. Hist. Q. C. Cork, Corresponding Member:—

MEMORANDA, CHIEFLY BOTANICAL, OF AN EXCURSION TO THE PYRENEES IN THE SUMMER OF 1856. PART I.

The completion of an uninterrupted railway communication between Paris and Bordeaux, and the opening of the line between this last city and Bayonne, have brought the magnificent scenery of the Pyrenees within the reach of a class of travellers to whom the time, expense, and fatigue, formerly required by a long and monotonous diligence route of more than five hundred miles, presented insuperable difficulties. The access to these interesting mountains will be further facilitated by the completion, in about two years, of the railway now in progress between Bayonne and Pau; so that professional men and naturalists, most of whom fall under the same category as the travellers I have just mentioned, will be able, during the few weeks of their annual vacation, and at a comparatively small outlay of labour and money, to explore the valleys and scale the heights of a district full of natural beauty, teeming with objects interesting to the student of nature, and possessing, in comparison with other mountainous districts of western Europe, what to many will be the greatest charm of all—the recommendation of novelty. To such persons the casual notes of a confrère may possess some interest and value. Having experienced the difficulty of obtaining precise and reliable information with regard to the districts most likely to be productive to the naturalist, I venture to hope that those under whose notice these memoranda may fall may, to some extent, be saved the trouble of inquiry, or spared the mortification of disappointment. I may mention, as a hint to those who may be doubtful as to the nature of the accommodation to be found in the mountains, that clean, if not very comfortable, lodgings may be met with in most of the valleys of the Hautes Pyrenees; and that ladies who can ride on horseback may traverse the principal passes, and ascend to the most remarkable mountain sites, without fatigue or danger. I was accompanied in the present excursion by my wife, and we found no difficulties in our rambles that

unduly taxed our courage or endurance. One point, however, requires consideration, as regards lodgings in the chief watering-places of these mountains. If the traveller visit them at the height of the season—that is, during the month of July and the beginning of August—he may often fail in procuring hotel accommodation, and may be obliged to pay dearly for small and ill-furnished rooms in the private houses of the inhabitants. This we found, to our cost, at Cauteretz, which on our arrival was filled with a crowd of fashionable loungers from Bordeaux, Lyons, and Paris, and could only afford us a comfortless apartment, at the price of £2 per week. Happily, the arrangements for "boarding" their numerous visitors are better cared for by their mountain hosts, and traiteurs and table d'hotes supply excellent provisions, at a very moderate cost.

We landed at Havre on the 14th of June, and having easily cleared our baggage, with which, as it included a microscope and other apparatus, I had anticipated some difficulty, we took up our quarters at the Hotel Frascati, beautifully situated on the beach without the fortifications, and free from the various and noisy accompaniments of a flourishing seaport. A few days were devoted to rambles in the immediate neighbourhood, to collecting Algæ on the shore, and plants on the heights of Cap de la Hève and the pleasant promontory of "Les Phares." No novelties were, however, detected, the vegetation and insect life being that with which I had been long familiar on the opposite coasts. The strangely bizarre form of the *Centaurea Calcitrapa* (star thistle) frequently met our regards, and the brilliant purple of the *Echium vulgare* (viper's bugloss), and deep blue of the *Salvia pratensis* (wild sage), claimed our notice and admiration. Amidst these flitted in the sunbeams the *Anthrocera Filipendulæ* (scarlet burnet moth), and the cerulean-winged *Polyommatus Argiolus* (azure-blue butterfly), both frequent on the Sussex Downs, and favourites during my residence at Lewes.

A morning's excursion to Trouville, on the opposite shores of the estuary of the Seine, here about seven miles wide, enabled me to collect a few plants that proved interesting. The sandy hillocks were coloured deep blue, with a profuse bloom of *Veronica Teucrium*, a species unknown on the English coasts, and whose large and handsome corolla strongly contrasts with its small, procumbent stems. The same locality supplied me with numerous specimens of *Bupleurum tenuissimum*, a denizen of the British isles, but very local in its distribution. Here it was growing on the sand hills. Our English botanists describe it as an inhabitant of muddy salt-marshes. I cannot account for this difference in its tastes on the opposite sides of the Channel. *Silene conica*, another rarity in Britain, was here abundant, together with a far more common plant, *Phleum arenarium;* a brown and very active Cicindela and an Ichneumon fly were also numerous; but the species were not known to me. We returned from Trouville by Harfleur, descending into the latter town by a long and handsome avenue of trees, forming a grand approach to a dull and dilapidated town, of about 12,000 inhabitants, but beautifully situated, and interesting from its historical associations.

Not being pressed for time, and being anxious to see my friend, M. de Brébisson at Falaise, we determined to forego the advantages of the railway to Paris, and, crossing Normandy, to take up the great southern line at Tours. This we easily accomplished by passing, in a small river steamer, from Havre to Caen, and thence, by diligence, to Falaise and Alençon. In the latter old and curious town we found comfortable apartments in the "Grand Cerf," an hotel not commended by Murray.

From Alençon to Le Mans we availed ourselves of the branch of the Paris and Brest Railroad, just completed between the former towns, and passed by diligence from Le Mans to Tours. During this portion of our journey I had no opportunity of herborizing, and could only note a few incidents in passing through a country singularly like, in its hedgerows and farm-yards, many of the agricultural districts of England. In the corn-fields near Argenton and Seeze, a species of the grape hyacinth (*Muscari comosum*), not found in Britain, together with the corn-cockle (*Agrostemma lithago*), became notably conspicuous; and as we approached the Chateau du Loir, half-way between Le Mans and Tours, and descended into the valley of the Loire, the influence of a more southern sun became obvious in the acacia hedges that lined the roads, and the vineyards which occupied the fields. Mulberry trees were also frequent; but whether they were planted for ornament only, or for the nourishment of the silkworms, I was not able to ascertain. One feature in the home culture of the peasantry, so frequent in north Italy, struck me as peculiar to this part of France, viz., the training of the vines on trellis-work around the cottages and farm-yards. In districts more exclusively devoted to the production of wine, this picturesque mode of growth is rarely encouraged, the vine stalks being carefully pruned to the size of low shrubs, and staked as raspberry bushes are in England: so that the appearance of a wine country is formal and monotonous, and to the eye of the traveller far inferior, in point of interest and beauty, to the hop gardens of Kent and Sussex. We noticed throughout our journey across Normandy that the orchards, so frequent in this district, were wholly devoid of any promise of fruit. This failure of the apple crop excited universal complaint, as cider, the common beverage of the people, had, in consequence of the blight, become as dear as wine, and was quite above the means of the ordinary purchaser. This blight of apples, and of other pomaceous fruit, we afterwards found, had been general throughout England and Ireland.

A delay of three days at Tours enabled us to form some estimate of the extent of the injuries inflicted by the late inundations of the Loire. The river was only just subsiding within its banks, and had left on either side vast tracts of mud and sand, which concealed from view the rich vegetation and luxuriant crops that had a few days before promised abundance to the cultivators of the soil. By ascending to the turrets of Plessis les Tours, "the castellated den of the tyrant Louis XI.," we were enabled to obtain a view, extending for many miles, along the valleys of the Cher and the Loire, and, as far as the eye could reach, nothing was to be seen in the lower grounds but a waste of sand. Many years must

be required to remedy the effects of such a desolation, as the depth of the deposit, often from one to two feet in thickness, precludes the possibility of its removal. When it is remembered that the same scene of destruction extended for nearly 200 miles along the banks of the Loire, some idea may be formed of the amount of labour and the value of the crops buried beneath the debris of this desolating flood.

One of our mornings at Tours was devoted to a visit to Mettray, and spent in a most interesting examination of the Reformatory School, established by the philanthropic efforts of M. de Metz and M. de Courteilles, the former of whom still lives to witness and rejoice in the success of his benevolent and holy labours. The mild and paternal, but firm and energetic, address of M. de Metz assures the stranger that he has before him a man of exalted views and disinterested purpose, whose character is sufficient to guarantee the success of any enterprise in which he might engage; and a careful scrutiny of the plans and labours of the Mettray establishment shows that the undertaking is one of the noblest to which such means can be devoted, and merits the success it has attained. Some of the rewards applied to stimulate exertion, and the punishments to repress idleness or vice, may appear too sentimental or theoretic to suit the colder atmosphere of a more northern climate; but the system, as a whole, addresses the common affections and feelings of humanity, and is capable of application to the criminal or neglected population of every country; and it is no small reflection upon the humanity and enlightenment of Britain that Mettray should have been working successfully for sixteen years in a field of benevolent labour, that we are only beginning to recognise as having claims upon the zeal and effort of every Christian philanthropist and enlightened politician.

The corn-fields in the neighbourhod of Mettray supplied me with abundant specimens of *Specularia Speculum* (Venus' looking-glass), and *Melampyrum cristatum*—the first unknown in Britain, except as a garden annual, and the second confined to a few of the eastern counties in England, and not a denizen of our Irish soil.

On the 26th of June we left Tours for Bordeaux, and reached the latter town, in about nine hours, by the Great Southern Railway. The country passed through during the drive was monotonous and uninteresting, and as we approached Bordeaux became more so, from the vast increase of vineyards. The weather also was becoming intolerably hot, which rendered travelling by day fatiguing, and induced us to hasten through Bordeaux, and locate ourselves 35 miles further on, at the village of Arcachon, on the great salt-water lagoon of the same name, where we hoped the heat of the sun might be tempered by the neighbourhood of the sea. In this, however, we were disappointed—not a breath of air disturbed the heated atmosphere, and the sandy hills of the Landes, covered with forests of pines, and reeking with the odour of resin, which exudes from the wounds with which the trunk of every tree is gashed, did not contribute to mitigate the enervating influences of the air, which maintained throughout our stay a temperature of from 78° to 86° Fahrenheit. Had herborizing been practicable, many novelties

would, no doubt, have rewarded the search. A short ramble into the forest, accomplished during the brief twilight of one of the least oppressive of our evenings, supplied me with magnificent specimens of *Helianthemum guttatum* (spotted rock rose), which is recorded in Power's "Flora of the County of Cork" to have been found at Three-Castle-Head, in the barony of West Carbery, and is said to have been collected in the islands of Anglesea, Man, and Jersey; but which is, doubtless, in every case, a wanderer from more southern habitats, and must be esteemed one of the rarest of British plants. *Cistus salvifolius* and *Erica arborea*, the latter (not in flower) forming shrubs of 10 or 12 feet high, were also plentiful.

Insect life was in great profusion, and during the hottest period of the day the garden of our hotel was visited by hundreds of the humming-bird moth, and other Lepidoptera by no means frequent in our colder latitudes.

The marshes near Arcachon are numerous, and would, doubtless, prove prolific of Diatomaceæ and other microscopic forms, both of vegetable and animal life. The only gathering which I made contained several interesting species; but I forbear in this paper to mention my collections in this department, having already communicated the detailed results of my journey as regards the Diatomaceæ to the editors of the "Annals of Natural History."

On the 30th of June we proceeded by railway to Bayonne, and, passing through this old and curious town, sought cooler quarters at Biaritz, on the rocky shores of the Bay of Biscay, a village rapidly rising into the importance of a town, and well deserving the patronage it receives from all ranks of the French people. Its situation is charming, and its rocks—the only rocks on the west coast of France for many hundreds of miles—are bold and imposing, and full of interest to the scientific visitor. In many places they consist of a conglomerated mass of *Nummulites*, whose forms stand out from the water-worn surface, and attract the notice and wonder of the least geological observer.

The hotel accommodation at Biaritz is excellent, and (when the new and handsome chateau of the Empress is not occupied by its illustrious owners, and the town crowded by their suite) is amply sufficient for the traveller's wants. We remained nearly a week at Biaritz, enjoying the refreshing breezes of its noble bay, and admiring the *abandon* of its numerous bathers, exploring its rocky pools, and rifling its flowery fields, and only tore ourselves away from its numerous attractions in obedience to a sense of duty which forbade us to linger amidst its softer pleasures, while the sterner attractions of the Pyrenees, the goal of our pilgrimage, lay within our view, and invited us to a wider, though more laborious field of observation and research. The coast at Biaritz yielded me a few interesting Nullipores, and Algæ of the smaller sorts, and the fields around added to my herbarium *Erica vagans*, the richly perfumed *Daphne Cneorum*, *Lithospermum purpuro-cæruleum*, *Lythrum Thymifolia*, and *L. Hyssopifolia*, with other less uncommon plants.

The ballot having been opened, the following were elected as Ordinary Members:—W. J. Cooper, A.B., and W. R. Reynall, Trin. Coll.

Capt. M'Clintock, R.N., was proposed by Mr. E. Percival Wright for election as an Honorary Member.

GEOLOGICAL SOCIETY OF DUBLIN.

WEDNESDAY EVENING, NOVEMBER 12, 1856.

The first meeting of the Society for the Session 1856–7 was held in 35, Trinity College, on the evening of the 12th November,

GILBERT SANDERS, Esq., in the Chair.

The Secretary read the Minutes of the last meeting, which were passed; and the following Paper was read by ROBERT H. SCOTT, Esq., C. E.:—

ON THE CARBONIFEROUS BEDS OF KILLYBEGS, CO. DONEGAL.

Having had occasion this summer to make a geological section, I, in company with a fellow-student, Mr. J. A. Russell, selected Killybegs as a locality suitable for the purpose. The strata there are Silurian, mainly converted into mica slate, with sandstone and carboniferous shale appearing in two districts. One of these, which I shall first describe, is the N. W. boundary of the central carboniferous basin of Ireland.

In the Fox's Glen, the bed of a stream which flows into Inver Bay, near St. John's Point, we came on black, shaly limestone, containing a great profusion of fossils. Here we found encrinitic stems, *Atrypa fallax*, *Spirifer glaber*, and *Orthis filiaria*, with several others. These beds of shale, with some of sandstone interstratified with them, occur along the whole of St. John's Point, as far as we went, which was only to Ballyderlan. In Mr. Griffith's map the whole Point is of the same colour, excepting a small belt at the extreme end, where the lower limestone appears. This we were unable to verify, as the distance by land was very great, and the weather did not suit for going there by sea. Along the shore the most remarkable fossils were, a very large Orthis, which I am told is *O. papilionacea*, and *Lithostration basaltiforme*. Plants have also been discovered in this shale.

We then crossed St. John's Point to a place near Riggagh Back, where we found the same shales as at the other side. At the point of Riggagh there is a small fault, very well marked. About 200 yards to the west of this, we find the junction of the sandstone and shale, which are perfectly conformable. When we passed M'Swyne's Castle we began to find traces of plants in great abundance in this sandstone. At one spot, about fifty yards east of a brook which comes down from Spamount, we came on a lenticular mass of shaly limestone, similar to

that which we had just left, and containing the same fossils. This widens out as it goes inland: we traced it for some distance to the back of the village of Dunkineely. It is sometimes very hard to find this bed on the beach, as in some winds it is nearly covered by the shingle, so that it might easily be overlooked. At the point of Darney we found a trap dyke cutting across the bedding in a direction nearly perpendicular to the strike. It is very clearly marked, and is the only place where we observed trap penetrating the sandstone, although we found a good many dykes through the mica slate. About this locality Stigmariæ occur in the greatest abundance. The fossil tree which Mr. Byron discovered last year, and which is in the Museum of the Dublin Society, was found near this dyke. We also found Sigillariæ and some leaves in the shaly beds which occur through the sandstones; however, the species is not perceptible in any of the specimens which we were able to obtain. At Bruckless Tannery the sandstone changes into a red conglomerate; however, the character of the shales is not altered. The lowest beds of this conglomerate are exceedingly coarse; they may be observed very well in the bed of the river at Hollybrook, and in the cutting for a new road opposite Killaghtee Chapel. The mica slate appears underlying the sandstone a little beyond the bridge at Hollybrook.

At Green Island, in M'Swyne's Bay, we have greenish slates with trap overlying them. This island can be reached by land at very low tides. At the back of Carntullagh, the headland which divides M'Swyne's and Killybegs Bays, we found reddish slates and sandstones, of a character different from those at Bruckless, and dipping at a higher angle. These appear to be the beds which are converted into mica slate in other parts. The centre of this headland of Carntullagh, and of that of Drimanoo, at the other side of Killybegs Bay, is occupied by trap, flanked on either side by mica slate.

The constitution of the other district, which commences at Fintragh, three miles west of Killybegs, is similar to that of the district already described, but presents greater variety, in consequence of its being intersected by faults, some of which are of importance. The district is a complete basin, the beds dipping inwards all round. We commenced at Fintragh strand, where we found mica slate, and soon came on the junction with the sandstone, the lowest beds of which were not as coarse as in the other places where we observed the junction. The sandstone in this basin is not marked by such a profusion of fossil plants as that under Dunkineely. In the overlying shale in this place we observed plants in one or two places, very indistinct. It is full of *Turbinolia fungites* and Encrinites, especially the former. It seems to be a purer limestone than that at St. John's Point, being harder, and of a bluish instead of a black colour. It has been worn out into caves in several places. About a quarter of a mile beyond the promontory of the Rinn we came on a fault in the limestone, and further on, before we reached Shalwy, we found beds of black shale, containing nodules, some of which appear to be impure ironstone. This

shale has been sometimes used by the blacksmiths of the neighbourhood in place of better fuel, and has been found to serve their purpose to a certain extent. Immediately underlying this bed we met the sandstone again, with abundance of plants: in one locality, close to Shalwy shore, we found a bed of yellowish shale at the bottom of the cliff, with Stigmariæ scattered through it: these are exposed by the action of the sea, which removes the shale from around them, and leaves them protruding from the face of the cliff. Not far from this spot, at the opposite side of the beach, we found a coarse conglomerate, similar to that which we had met with at Hollybrook, and the mica slate underlying it. From this to Muckrossallagh we observed, in two isolated patches, a skin of this red conglomerate, bleached white, resting on the mica slate. This is further exemplified by the appearance of an outlier of this same conglomerate, forming an island at a place where only mica slate appears on the shore. Before we reached Muckross we saw the Pigeon Caves, which have been excavated by the sea at the junction of the slate and sandstone. Their appearance, owing to the light reflected from their flooring of mica slate, is extremely beautiful.

From Muckrossallagh to the extreme end of the headland there is shale similar to that at the Rinn: however, its strike is different from that of any of the other beds along the coast.

We were unable to trace the sandstone inland, owing to our having but little time. From the appearance of the country it seems probable that the mountain of Crownarad bounds it on the western side.

I may add, that we observed sandstone similar to that at Dunkineely, and as full of fossils, at Mountcharles, near Donegal. This we did not notice until we were leaving the country, when we walked into a quarry on the hill, which leads up to the town on the west side, while our car was going up the hill.

Professor Haughton expressed his pleasure at hearing Messrs. Scott and Russell's paper. A controversy had arisen between Irish geologists and some of their friends on the Geological Survey as to the true age of the plant beds in the north and south of Ireland. Mr. Haughton considered that Mr. Scott had clearly established the position of the northern plant beds, as immediately overlying the Old Red Conglomerate; and as there could be no doubt of the true carboniferous character of the plants of Donegal, he thought they threw much light on the corresponding beds of the south of Ireland, which, in his opinion, could not be considered as anything but carboniferous.

Mr. Scott observed that the visitor to Killybegs would have other geology besides that of the carboniferous beds, which would be well worth investigation. There is also in that neighbourhood some of the finest cliff scenery on the coast of Ireland, viz., the cliffs of Slieve League and Glencolumkille, which are at present hardly known, in consequence of the difficulty of communication which has hitherto existed, but which is now to a great extent removed.

J. R. Kinahan, Esq., M.B., then read his paper—

ON ANNELIDOID TRACKS IN THE ROCKS OF BRAY HEAD, COUNTY OF WICKLOW.

All traces of animal remains, how indistinct soever, met with in rocks so low down in the series as the Cambrian, must be looked on as important. I have, therefore, ventured to bring before the Society to-night some unmistakeable animal traces which came under my notice, during the past summer, in the Cambrian rocks of Bray Head, county of Wicklow, and which, as far as I know, have been hitherto undescribed, if not unnoticed. They occur in such abundance, and are so unmistakeably marked, that there can be no difficulty in detecting them. As to their nature, they would appear to be rather animal tracks than the remains of animals, being the filled-up burrows of some borer, probably annelidan. They occur, for the most part, in company with the beds of Oldhamia, although there would not appear to be any actual connexion between the two. The chief beds of them occur on a small cove situated on the N.E. side of Bray Head, immediately after rounding the hill from Bray. Here a number of low-lying, somewhat slanting, beds of green and red slate occur, chiefly as detached rocks lying off shore, but left dry by the tide at low water. The tracks are found also in several places along the whole shore to Greystones, and also on the top of the hill.*

They occur as rounded tubuli, running either vertical to or in the same direction as the bedding; in the former case they present a circular, in the latter an ellipsoidal section. They vary much in appearance, and are of every length, from 1 inch to upwards of 2 feet; and, in diameter, from the thickness of common sewing-thread to 0·3 inch and upwards. There appear to be at least two different kinds of them: some of those running in the same plane as the bedding, differing much from the vertical tracks. These latter are generally long, and of nearly the same diameter throughout, except at their upper extremity, where they spread out into a rounded knob, as though the extremity of the tubes were cupped. This form occurs also running nearly horizontally to the beds; the thread-sized tubuli differ from them also chiefly in the fact of their occurring in pairs. The other set of fossils are seldom more than an inch in length, and taper away to each end. They occur best marked in a gritty red slate, with numerous shining black particles through its substance. The thread worms occur, generally in the red beds, in immense profusion, closely resembling those tracks detected by Mr. Salter in the Cambrian rocks of the Longmynd (Quart. Journ. Geol. Soc., London, 1856, p. 246); they are here associated with *Oldhamia antiqua;* they occur also, though rarely, in greenish-gray beds of *Oldhamia radiata,* being then in the direction of the bedding.

* Since the above was read, the author, in company with R. Scott, Esq., C.E., found, in a compact green rock, traces of a different character from those here detailed, probably molluscan, in company with remains similar to those fossils commonly called "Fucoids," which he hopes to describe at a future period.

The commonest tracks, however, are those first mentioned, which are to be found in the greatest numbers in the beds over and underlying beds of *Oldhamia radiata*, though found even intersecting these beds themselves. One track was found which could be traced from the red bed beneath the Oldhamia, and through, or at least into, a red bed above the Oldhamia. The system of beds in which they are most abundant, as seen here, is generally 5 feet thick, and made up as follows: above and overlying the system, a layer of green quartzose rocks of compact texture, having its surface in parts ripple-marked, and overlaid by a layer of *Oldhamia radiata;* next a bed of red shaly slate, often much disintegrated, with slight traces of Oldhamia and a few vertical tracks; next, a red gritty slate, with black points scattered through it, the tubuli few, and generally of the kind with tapering extremities; next, a compact bed of red slate, intersected in every direction with tracks; the whole bed, as it were, knit together by them; next, a layer of *Oldhamia radiata*, pale-grayish in its colour, from 0·25 inch to 3 inches in thickness; tracks generally few in number (this bed sometimes more or less stained with red); next, a bed of red shaly slate or compact red slate; tracks in the former case few and vertical; in the latter numerous; then a red fissile slate bed, in which I did not detect any tracks (this bed often wanting); then the gritty red bed:—this system, with slight variations, occurring three or four times over, and resting on the green quartzose rocks.

In many places the red beds are much thinned out, and occur only as veins three or four inches thick.

Short vertical tubuli (*vide* Plate I.) occur in nodules, which are abundant in the green quartzose beds in parts. Mr. Salter, who accompanied me here on one occasion, pointed out, on the lower face of one of the beds, rounded knobs corresponding to the cupped termination of the tubuli and rounded elevations, casts of trails of worms on the top of the mud. He also obtained one or two imperfect specimens of these last in the white quartz rocks, which here protrude. Though frequently found crossing, on careful examination I was unable to detect any branching among these tubuli. When closely examined they are found to be made up of concentric laminæ, of about the thickness of ordinary writing-paper, depressed in the centre, like a pile of watch-glasses. In every instance the tubuli are found to be of a different colour and texture from the surrounding rocks, as though their contents had undergone some chemical or other change, such as we know is communicated by recent Annelidans to the sand which passes through their bodies. In some instances the rock in immediate contact with the tubuli was found to be stained of a darker colour, like that which is frequently found in the circumference of the burrow of Arenicola; this is chiefly seen in the rounded, tapering tubuli.

The vertical tubuli found in the quartzose rock differ in shape from the others here described, tapering gradually from above downwards. Even after a very careful examination I could not satisfy myself as to whether any of these animals possessed a tube or not; if they did, it must have been membranous, and many things about the tracks seem

to point to its existence, at least in some cases. I think I am justified in stating, that there is nothing more than an accidental connexion between these tubuli and Oldhamia; indeed, it appears nearly certain that some, at least, of the animals, whether molluscan or annelidan, by which these tubuli were made, must have lived not merely posterior to the death of the Oldhamia, whose remains make up these layers, but even after the deposition of a layer of mud on these remains. And I cannot conclude without expressing my firm conviction that a careful research, by other and more practised hands, cannot fail to bring to light even more interesting remains than these here described; for, as may be gathered from the result of this hurried examination, every kind of rock here furnishes us with some trace or other of animal life.

EXPLANATION OF ACCOMPANYING PLATE.

FIG. I.—Tracks in gray beds of *Oldhamia radiata*;—showing (*a*) vertical tubes; (*b*) thread-like do.; (*c*) laminated structure of tubuli.

FIG. II.—(*a*) Vertical tubes; (*b*) thread-like parallel tubuli.

FIG. III.—Tracks from red bed, showing crossing tubuli.

FIG. IV.—Vertical tubulus from green quartzose rock.

FIG. V.—Tracks in red beds, showing Tubulus curved on itself in connexion with *Oldhamia antiqua*.

NOTE.—The Oldhamia occurring in connexion with the tubuli is not shown in Figures 1, 2, 3, and 5.

Dr. Kinahan exhibited numerous specimens in illustration of his paper, which gave rise to an interesting discussion, in which many of the members of the Society present joined.

WEDNESDAY EVENING, DECEMBER 10, 1856.

J. B. JUKES, ESQ., F.R.S., in the Chair.

THE Chairman announced that since their last meeting they had to lament the death of their late Assistant Secretary, Mr. Hitchcock, an event which no one regretted more than himself.

Mr. Hartstonge Robinson, and J. Maguire, C. E., being proposed and seconded, were elected members of the Society.

Mr. W. L. WILLSON then read his paper:—

ON THE GEOLOGY OF THE NEIGHBOURHOOD OF KENMARE.

THE valley of Kenmare is about one mile broad at the town, from whence it extends eastwards, gradually becoming narrower for about nine miles, to the village of Kilgarvan. The rock forming the bottom of the valley is the lower carboniferous limestone, which consists of beds of a pale gray crystalline limestone, much jointed and cleaved, the latter giving a thinly laminated and platy structure to the rock. The lowest beds are of a darker gray, and often deep blue colour, and are seen to rest upon blue and black shales and gray grits, with purple slates and sandstones, both upon the north and south of the valley. The general strike of the limestone and other beds in the Kenmare Valley is about 25° north of east; this strike is very constant for miles over this district.

Some good sections of the lower beds of the limestone, and the rocks immediately beneath, are seen here and there along both the northern and southern boundaries, but particularly the latter. I shall notice two or three of these sections proceeding from the town of Kenmare eastward to Kilgarvan. At Roughty Bridge, about two miles from Kenmare in this direction, we have a section which, in descending order, consists of the following rocks:—First, blue and gray thick-bedded limestone, with crinoidal fragments; then a bed of pale purple crinoidal limestone, which rests upon blue and black shales and slates, in the upper part of which are thick calcareous bands abounding with fossils.* These beds rest again upon hard gray and yellowish gray grits, with narrow beds of gray gritty slates, also fossiliferous. The latter beds are particularly well seen under the principal arch of Roughty Bridge. And, finally, these beds rest upon dull red and purple slates and grits, with occasional green bands, the upper portion of which are often calcareous. The thickness of these rocks here, between the limestone and the red slates, is about seventy feet; at the Bridge they all dip to the north at about 70°, but become nearly flat and are much twisted immediately under the Bridge to the south, both in the river and on the opposite side from this spot. The black shales and slates on which the limestone rests are seen to dip suddenly to the south and north again, thus forming a small basin or trough of the lower beds of the carboniferous limestone at this place, about a quarter of a mile west of Roughty Bridge, and immediately south of a place called White House on the map. The limestone is seen dipping north at 80°, and a little north of this again, in an old quarry on the edge of the Kenmare road, opposite Killowen House, the limestone is seen to dip south at 70°. The dip here is well marked by a bed of soft black shale, which divides the thick beds of gray crystalline limestone.

The next place where the dip is well seen in the limestone is in crossing the valley to the north, in the Cleady river, close to Kilpatrick grave-yard, where there is a well-marked dip of 55° to 70° to the south; and further along the northern boundary of the limestone, at Ardtully copper mine, where the limestone is well exposed and fossiliferous, the dip is observed to be north at 80°. Thus it will be seen that the limestone forming the valley of Kenmare does not dip uniformly to the north from the southern boundary, or south from the northern boundary—thus forming one simple synclinal trough of great thickness—but is

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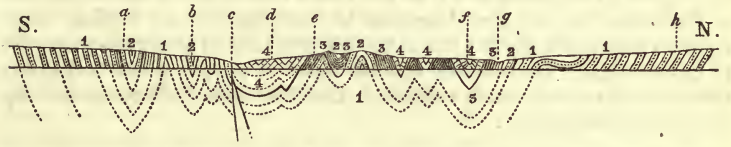
* Mr. Salter has been kind enough to give me the following list of fossils got near Roughty Bridge:—

Fossils of Carboniferous Slate overlying the thin beds of Argillaceous Sandstone.

Spirifer disjunctus.—Sow.
Strophomena crenistria.—Phill.
Orthis filiaria.—Phill.
Stems of Actinocrinus.
„ Poteriocrinus.
„ Rhodocrinus.
Fenestella, rare.

probably made up of a series of small contortions, from north to south, across the valley, repeating the same beds over again, and thereby diminishing the apparent thickness we should otherwise have of these beds. Along the northern side of the river Roughty the limestone is seen to form rough mounds and rocky knolls here and there in the ground, being quite massive in outward appearance, but still seen to retain the usual laminated and slaty structure when fractured, and often contained irregular bands of chert. I remarked that the dip surfaces of the rocks which face the valley are much water-worn and rudely furrowed by water-action in that direction. If we now trace this limestone from Clontoo, a little south of Ardtully copper mine, eastwards, we see that immediately east of this place it suddenly changes the hitherto constant strike, and becomes much contorted on its northern boundary. Coming round to the south to Ardtully House, close to which there is a quarry, in which the limestone is seen to have a northerly strike, dipping south-west at 70° north. Close to this quarry at Fassa Bridge the blue and black slates and shales, similar to those beds noticed as the rocks on which the limestone rested at Roughty Bridge, on its southern boundary, are seen dipping under the limestone. From Ardtully House the limestone forms an irregular boundary eastwards, and being contorted, and curving round to the north by Fassa Bridge, is again seen, about 500 feet east of the latter place, in a large quarry close to the old road to Kilgarvan, dipping south at 60°, and resting upon the black and blue slates and shales mentioned as occurring at Fassa Bridge. From this the northern boundary of the limestone continues pretty steady in an easterly direction to the police barrack, situated at the west end of the village of Kilgarvan, and is seen constantly in junction, or nearly so, with the black and blue shales and slates which bound it on the north from Fassa Bridge. But, before leaving Ardtully, I would beg to notice the sudden manner in which this band of limestone, and the rocks southwards (hitherto seen to form a broad band across the valley) narrow from Clontoo to Ardtully. Between Ardtully and Roughty Bridge, on the southern boundary of the limestone, immediately north of Kilgortaree House, on the map, we see the same rocks as we have at Roughty Bridge, viz., gray grit, slates, &c., dipping still north at 80° south of Ardtully House, and in the bend of the river Roughty a good section of the limestone is seen. The beds seem to dip south at 75°, consisting of massive pale gray limestone, then thin beds of fine crystalline limestone, with hard siliceous layers weathering out like chert bands, which are succeeded by thin beds of white and greenish compact marble, separated again by thin layers of pale greenish shale, which do not appear to be calcareous. These beds are seen again in the line of strike, a little to the east of Ardtully Old Bridge, about a quarter of a mile distant from this spot, and appear to dip still south at 55° in the former section; south of Ardtully, immediately south of the chert and siliceous limestones, we see dark red and purple slates and grits apparently dipping north at 80°. If these dips be correct, there must necessarily be a fault along the southern boundary of the limestone cutting off some of the

lower beds of the limestone, and the beds immediately beneath it, which we have traced from Roughty Bridge to Kilgortaree House, a mile distant from this point. We see no trace of these beds along here between these points. The fact of a fault existing here along the southern boundary of the limestone would account, in some measure, for the sudden narrowing and apparent thinning of the limestone, as well as the absence of the beds beneath it at this point. I shall now trace the limestone eastwards to Kilgarvan village, where I think there is further evidence of the existence of an east and west fault, which commences a little south-east of the village, and follows nearly the course of the river Roughty westwards, terminating nearly opposite Clontoo, where the limestone suddenly becomes so narrow. From the river Roughty, south of Kilgarvan, up to that village, we see a good section of the rocks. In the river we have dull red and purple slates, parts of which are calcareous; these beds strike nearly east and west, and dip north at 85°; about 200 feet north of the spot, we find strong beds of limestone and black shales striking south-east, and dipping south-west at 45°. Thus, these beds, if prolonged in this strike, would abut against the red slates, which are seen in the river to strike east and west, and dip north at 85°. Therefore, there must be a fault here running nearly east and west down the river Roughty, which cuts off the lowest beds of the limestone, as well as the band of black and blue shales and grits, and the band represented by No. 2 in the accompanying section, which is the upper part of the Old Red Sandstone containing the yellow beds:—



Section across Kenmare Valley, half a mile west of Kilgarvan, on the scale, both vertical and horizontal, of two inches to one mile.

a. Road.
b. Road.
c. Roughty river.
d. Glebe-house.
e. Kenmare road.
f. Stream.
g. Owbeg river.
h. New road.

4. Lower Limestone.
3. Carboniferous Slate.
2. Yellow Sandstone.
1. Old Red Sandstone.

I shall now draw your attention to the ground north and north-west of Kilgarvan, through which this section is drawn. It is drawn from Carrigagreenane Hill, about two miles and a half north-west of Kilgarvan, to a stream south of Carrignagown Hill, about two miles south-west of Kilgarvan. I shall commence at the river Roughty, and notice the rocks seen in the section to the northern end. We see, first, this band of limestone forming a band along the northern side of the river Roughty; the dip of the beds seem to be south from the road to Ken-

mare, where a junction is seen between the limestone and the black slates and shales beneath. Passing from thence, we cross over a low, undulating country, formed by these contortions in the limestone and the rocks immediately beneath them, till we come to this last undulation, in which the limestone is seen to dip south at the Owbeg river, from thence we have an almost unbroken section of rocks seen up the Owbeg river to Carrigagreenane, the northern end. Commencing at the limestone at the Owbeg river, we find, in descending order, the following thickness of rocks:—First, about 200 feet of blue and gray crystalline limestone; then about 120 feet of blue and black shales and slates, the upper portion being very calcareous or fossiliferous; again, about 100 feet of gray and yellowish-gray grits, with gray gritty slates; then about 3000 feet of dark purple slates and grits, alternating evenly, grits predominating; then about 1800 feet of greenish-gray grits and slate bands, with thin bands of purple slate and conglomerates in the lower beds, pebbles of white quartz and jasper being common; beneath these again we have about 1400 feet here; but the thickness of these beds is much greater, as on the southern side of the section, where they average 2100 feet; then we have here a tolerably clear section from the limestone at the Owbeg river, where we start from carboniferous limestone, to Carrigagreenane, two miles up northwards, showing a total thickness of 6200 feet of rocks, which seem to be all conformable to the limestone. This section can be checked over and over again north-eastwards and westwards, and will be found to coincide with the others in making this thickness; and I do not think this to be the total thickness of the rocks beneath the limestone in this district, for further south towards Slugmuffe Hills I found these lower beds of greenish-gray grits to have beneath them again another band of purple slates and grits; but the rocks are so much contorted, that the same beds recur and dip again into Bantry Bay.

The Rev. Professor Haughton said the survey of Mr. Willson had been made in the same district which had been visited by him some years ago, and that his sections, which had been published in the Journal of the Society, were somewhat less detailed, in consequence of his survey having been made more in reference to the metallurgical character of the district. He had found that the copper was all confined to the slate, and the lead to the limestone formation; but in every case the lodes coincided with the strike of the strata, as also with the dip. In this they were similar to the Mansfield mines, which were worked like beds of coal, the copper being found in horizontal beds instead of in fissures and cracks, as was usually the case. He did not think these copper beds were ever likely to prove remunerative in an industrial point of view, but to a geologist they were highly interesting, and they were much indebted to Mr. Willson for his valuable paper.

Captain C. P. Molony, Madras Army, then read the following notice of—

THE OCCURRENCE OF DRIFT COAL IN SAND NEAR NEWCASTLE.

During a tour in search of geological information, that I made last summer in England, I visited, amongst other places, Durham, near Newcastle-on-Tyne. About a mile and a half from the town is a famous coal-pit, called Old Durham, which I went to see. On leaving it, happening to inquire the shortest way back to Durham, I was told to take a road leading through a wood, on the bank of the river, that was pointed out to me a short distance off. The wood lies on the side of a low hill that runs down to the water's edge. In the cuttings made to form the road appeared several very thin beds of coal, which at first were not more than a quarter of an inch thick; but further on, the road winding down the hill, and the cutting becoming deeper, fresh beds, thicker than those first seen, were exposed to view, two of which are each from 12 to 14 inches deep. On examining the beds and digging out part of them, I found them to be made up of sand and round pieces of coal, so unlike in that respect the coal of our coal-pits, that I concluded that I had met with drift coal. I took several pieces from different beds, and all showed marks of having travelled from a distance. All the beds are in a yellowish buff-coloured sand; and immediately above this sand, where the two thick beds are seen, occurs what is commonly called drift, with round stones in it, as large as a child's head. [Captain Molony exhibited a rough sketch, taken from memory, and said]—I regret I had not more time at command to enable me to give a minuter and more satisfactory representation of them, as I had only paid a flying visit to Durham, and was obliged to hurry back to the station to catch the train that was to take me on to Edinburgh that night. These beds are, to all appearance, perfectly parallel, and you will perceive that the several specimens taken from them, which I place before the meeting, are rounded on the edges, and bear every appearance of being drift matter. Having never heard or read in any book on geology, of drift coal that had actually been seen—for I deny that beds containing minute stems and delicate leaves are drift coal—I am anxious to bring the occurrence of these beds before the meeting, in hopes that some member more talented and better acquainted with geology than myself may find an opportunity some day of visiting the place and favouring us with his views on the subject. I beg you will not suppose that I attempt in any way to disprove the theory of our coal-hills being formed of vegetable matter that grew on the spot where it now lies. Such is not my intention, for I believe in that theory myself, and bring forward this drift coal as a proof that the coal we burn is not drift coal. The proofs I adduce in support of this being drift coal are these:—Its being found in pieces, and not in a continuous mass or bed; the rolled appearance of these pieces; and the spaces between them being filled up with sand; and, lastly, the absence in the beds of any trace of the fossil organic remains usually found in coal-beds, such as Sigillaria, Stigmaria, &c., &c.; in fact, that they are the denudation of a bed of coal already formed, but, unlike their parent bed, they contain neither leaves, stems, nor roots.

Mr. Kelly observed that at Lough Erne, and other places, lumps of coal were frequently found before getting down to the cutting. It was possible that ice might have been concerned in the transport of these fragments.

The Rev. Dr. Lloyd, S.F.T.C.D., exhibited a photograph of one of the lunar mountains, taken from a drawing by Father Secchi, of Rome, of "Copernicus," one of the most interesting of these mountains. At the meeting of the British Association in Belfast, a committee was formed for the purpose of considering the appearance of the moon in relation to the geology of the earth, and it was thought advisable that certain portions of its physical structure should be very carefully examined, and compared with corresponding elevations on the surface of the globe. It was with the view of aiding the Committee in their labours that photographs had been taken of this celebrated drawing, which appeared to be very elaborate. The distribution of the lines of elevation was very systematic and regular, and the smaller craters surrounding the great one, which was of a reticulated structure, were very curiously marked. It seemed as if large rocks had been shot out of the larger orifice.

DUBLIN NATURAL HISTORY SOCIETY.

ANNUAL GENERAL MEETING, NOVEMBER 14, 1856.

Robert Callwell, M.R.I.A., in the Chair.

The Minutes of the preceding meeting having been read and confirmed,—

The Chairman stated that, before proceeding to ballot for the Officers for the ensuing Session, it was necessary for the Society to decide on the propriety of carrying out the suggestion of Council with regard to the proposed alteration in the constitution of the Society. He would call on the Honorary Secretary to read the rule and proposed alteration.

Dr. J. R. Kinahan, Honorary Secretary, read the rule and proposed alteration, as follows :—

Rules, section 1, clause 3.—"The Officers of the Society shall be chosen from the ordinary members, and shall consist [of a President, two Secretaries, and a Treasurer; and that these, with fifteen other ordinary members, constitute a Council."]

For the latter part of this it was proposed to substitute :—

"That the Officers of the Society shall consist of a President (to hold office for one year only), four Vice-Presidents, two Secretaries, and a Treasurer; and that these, with thirteen other ordinary Members, shall constitute a Council." The only alterations proposed were the nomination of four Vice-Presidents, and the reduction of the number of ordinary members of Council.

Mr. G. Sanders wished to know whether it was not irregular to entertain this motion without further notice to the members?

Dr. Kinahan read the Rules relating to this point, from which it appeared that due notice had been given by the Council of the proposed alteration in the Rules.

After some further discussion, it was proposed by the Rev. J. A. Galbraith, and seconded by J. Kift, Esq., and—

Resolved—That the words "to hold office for one year only" be omitted from the proposed alteration.

The Chairman then put the question—"That the Society do now proceed to ballot according to the list of Officers prepared by the Council," which passed unanimously.

The ballot for Officers was then opened, during which the Chairman called on Dr. Kinahan (in the unavoidable absence of Mr. Andrews, Honorary Secretary) for the

ANNUAL REPORT.

Gentlemen,—Your Council, in laying before you this, the seventeenth Annual Report, have to congratulate you on the steady progress of your Society during the past year, as evidenced both by the accession of new members, and the valuable communications read at the meetings. During the past Session the following papers were read, the majority of which appear *in extenso* in the published Journal of the Society, now ready for distribution among the Members:—

In Zoology—"On Enterolithes," and "On Malignant Disease of the Bones in the Red Deer," Professor R. W. Smith; "On the Genus Skua," Dr. Farran; "On the Occurrence of the Common Bittern in the Co. Carlow," and "On Lepidoptera injurious in Granaries," James Haughton, Jun., Esq.; "On the Occurrence of the Egyptian Goose" (*Chenalopex vulgaris*); "On Edgemoulting," and "On Albinos," R. J. Montgomery, Esq.; "Rare Birds obtained in the Co. Louth," Lord Clermont (communicated); "On Change of Colour in Common Fowl," R. P. Williams, Esq.; "On Occurrence of *Thecla betulæ* and *Gonypteryx Rhamni*, in Kerry," William Andrews, Esq.; "On Migration of Birds," Dr. Kinahan.

In Botany—"On *Asplenium fallax* of Lowe," and "On the Fungi of the West Coast of Ireland" (two papers), W. Andrews, Esq.; "On the Natural Affinities of Botrychium and Ophioglossum," and "On *Botrychium lunaria* and its Varieties," Dr. J. R. Kinahan; "On *Saprolegnia ferox*, and Disease caused thereby among Goldfish in Vivaria," Dr. Frazer.

In Mineralogy—"On the Analysis of Spodumene and Killinite," Rev. Professors Haughton and Galbraith.

The donations to your Library and Museum have been numerous. Among those to the latter may be particularly noted fine Irish specimens of the Egyptian goose, from Lord Clermont; and of the blackcap warbler, brambling, and common crossbill, from Edward Dombrain, Esq.

Many new members have been added to your Society during the past year, and several of the former members have rejoined, whilst but one member has retired.

At the ordinary meeting held in January, 1856, your Society, at the recommendation of Council, determined to hold a number of extra meetings, of a more popular character than the ordinary meetings, to which ladies should be admissible. Accordingly, three were held, and the following papers read:—On April 23rd, "On the Ferns of Ireland, their Distribution and Mode of Cultivation," William Andrews, Esq.; on May 21st, "On the *Crustacea podophthalma* of Ireland, their Habits and Metamorphoses," Dr. Kinahan; and on June 25th, "On the Mollusca of Ireland," Dr. Farran. These meetings were numerously attended, and were considered so satisfactory that your Council recommend the repetition of the experiment during the ensuing Session, the time for holding them to be fixed at the January meeting. Your Council have also, in virtue of the power vested in them, to recommend that the constitution of the Council be so far altered as to admit of the election of four Vice-Presidents, in addition to the President, heretofore annually chosen; and have, accordingly, recommended the four gentlemen whose names appear in the list for this office, by which arrangement they hope to obviate the inconveniences which have occurred during former Sessions, arising from the want of a fixed Chairman, especially at the popular meetings.

It was proposed by the Rev. Professor Haughton, seconded by James Haughton, Jun., Esq., and unanimously carried, that the Report now read be adopted.

Mr. R. P. Williams next submitted the Treasurer's Report for the past Session, from which it appeared there was a balance of 14*s.* 7*d.* to be carried forward, and that £20 (subscriptions) was still due, and that the reserve fund amounted to £58. Mr. Williams further stated that thirteen new members had joined during the past session, and three former members had rejoined, whilst but one member had retired from the Society. The balance to their credit would have been much larger but that a new item appeared in the account of this year, viz., that for publication of the Society's "Proceedings." This additional outlay, he hoped, would be met by the accession of new members. He might mention that four gentlemen were to be balloted for that night, and notice of three others had been given for the next—an evidence that the ensuing Session would be equally successful. Another important matter was, that the collection now contained so many rare specimens, that it was considered advisable to insure it against accidents, and the property had accordingly been insured for £500, which would, no doubt, be deemed satisfactory to the present, and encouraging to the future members.

The Report having been adopted,—

The Chairman declared the following members unanimously elected as Officers of the Society for the Session of 1856–7:

President—Professor William H. Harvey, M.D., M.R.I.A.

Vice-Presidents—His Grace the Archbishop of Dublin; Lord Talbot de Malahide, M.R.I.A.; Sir Edward R. Borough, Bart., M.R.I.A.; C. P. Croker, M.D., M.R.I.A.

Council—John Aldridge, M.D., M.R.I.A.; Robert S. Barklie; Henry M. Barton; F. W. Brady; Robert Callwell, M.R.I.A.; James R. Dombrain; Charles Farran, M.D.; Samuel Gordon, M.D., M.R.I.A.; Rev. S. Haughton, F.T.C.D., M.R.I.A.; Robert J. Montgomery; George B. Owens, M.D.; Gilbert Sanders, M.R.I.A.; Joseph Todhunter.

Treasurer—Richard P. Williams, Esq., M.R.I.A.

Secretaries—William Andrews, M.R.I.A., and John R. Kinahan, M.B.

The meeting was then made special, for the purpose of balloting for members, and the following were declared duly elected:—Edwin Birchall, Esq., Dublin; J. Neligan, Esq., Tralee; Robert Roberts, Esq., Harcourt-terrace; J. B. Doyle, Esq., Dublin.

The meeting then adjourned to the month of December.

DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

ENTOMOLOGICAL NOTES. BY A. H. HALIDAY, A.M.

These notes, presented to the meeting of the Association on the 21st of November, 1856, were referred to the Secretaries as a Committee of Publication. As the Illustrations of new or little known British insects forming part of them are intended to appear, accompanied by figures, in a future Number, only the notices appended, of captures and observations during the past season, are given here.

I have very little to lay before the Association as the result of collecting during the past season. Indeed, when I say that there were barely ten days of the summer on which I was able to collect at all, and this only in the neighbourhood of Dublin itself, or the adjoining county of Wicklow, which is comparatively beaten ground for Irish entomologists, it will not seem strange that the produce should be small,—perhaps rather encouraging that I have been able, with so little opportunity, to add to the Irish Insect Fauna two genera of Diptera, and to increase by one new species a group of this order, which has been particularly attended to previously in our own islands,—the Ephydrini.

An excursion to Lough Bray by a small party of the members of this Association, on the 4th of July, was not very productive. It was too late for *Empis borealis*, which was common there the preceding year, when a similar visit was made in May. Now, *Rhagio scolopaceus* instead was the most conspicuous fly that hovered over the tufts of whortleberries

and the storm-bowed stunted ash-trees. The face of the hill towards the upper lake lay black and desolate, the heather having been fired. In the lake itself, however, the botanists of the party found attraction enough to plunge, beyond their elbows, among the beds of *Isoetes lacustris* in bloom. The entomologists were less fortunate. The only thing worth recording by them is the capture of a second specimen of *Pelina œnescens*, nearly in the exact same spot where the first was taken the preceding spring, viz., beside a little stream which brawls, half-hidden among huge boulders of granite and deep beds of moss, as it descends from the lower lake to swell the waters of Glencree river.

Later in July, I was staying a few days at Newrath Bridge, and my walks were mostly, from that up the wooded valley of the Vartrey river, to the romantic gorge called the "Devil's Glen." It was here that the examples of the two genera referred to occurred. These were *Zygoneura sciarina* and *Atherix ibis*. Of the latter I found several specimens, but was not so fortunate as to witness the singular assemblages of this species which a writer in the "Entomological Magazine" has described. The females resort to trees overhanging the water, and there deposit their eggs, in a cluster, on the under-side of a leaf, so that the larvæ, when hatched, may fall into the water; after laying, the parent fly dies, clinging to the leaf. Others associate themselves there for the same purpose, till the leaves become loaded each with a pendant pyramid of the dead flies, conspicuous by their prettily banded wings. A German writer declares that he saw on one occasion a beech-tree, nearly every leaf of which bore such a charnel heap. I had an opportunity of observing the *Cyphon deflexicollis*, which abounded in the Vartrey, in all stages of its growth. This species is almost as truly a *water-beetle* as the Elmides, which often leave the water to climb up the stems of plants, and sun themselves, or use their wings to seek new quarters. The Cyphones were busy creeping among the wet gravel, or at the bottom of little pools, to lay their eggs there; while, on lifting up stones, to procure the larvæ and pupæ from the under-side, the newly disclosed beetles also came up abundantly to the surface, each enveloped in its own silvery air-bubble. Their coat of down is quite impervious to moisture, and, floating securely on the surface, they spread out their long wings, and rise with ease from the water. Among the small Diptera which swarmed about the river-bank, I found what may probably prove a third British species of Corynoneura. In the window of my apartment I observed daily some fresh specimens of the *Tanypus pusillus* and a few of *Pericoma bullata*. In company with Mr. E. P. Wright, I visited the lagoon, fringed with bulrushes—the Broad Lough—which lies between the Murrough of Wicklow and the main land. Unfortunately, we had neither of us an insect-net, and so the rare *Rhamphina longirostris* was *seen* only. *Pœderus fuscipes* was common on the mud, and we succeeded in finding the larva also.

During the exceedingly hot weather which ushered in the month of August, I was for three days at the southern extremity of the county of Wicklow. The burning sun seemed to have made the human popu-

lation half amphibious; and donkey-carts, which had conveyed the inland dwellers to the arms of Neptune, were drawn up, about the time of high water, along every sheltered cove and sandy bight of the shore, relieved of their living freight now seeking coolness and comfort amid the yielding waves. The undulating expanse of bleached sands, which stretches away north and south of the frowning bluff of Arklow Head, lay sweltering under the tremulous eddy of the heated air, in dazzling uniformity, as wearisome to the eye as the too impressible soil was to the feet, giving way under every tread. Numbers of the large-headed black ant, *Formica fuliginosa*, were abroad. This species usually makes its nest in rotten trunks of oak-trees: here they were far from any site of that sort, but seemed quite busy and happy in the torrid heat. Off the herbage in the hollows, consisting of dwarf willows and other less shrubby plants, I swept a pretty—and, as far as I can make out, undescribed—*Globiceps*, which I had taken once before in this county, at about 1800 feet of altitude, on Lugnaquilla. My walk over the Head, from which a steep, rocky path leads down to the nooks, fringed with *Asplenium marinum*, where Mr. Wright had discovered *Nebria complanata* abundant a month earlier in the season, did not procure for me a single specimen of this. In some hollows of the seaward face of the cliffs, moistened by oozings of fresh water, soaking through from the heights above, *Machilis maritima* was collected in troops, sipping the clear lymph from the brim. *Orphnephila testacea* was there also, and *Hydrophorus virens* gleaming like a beryl, as it rested, lightly poised, on its slender legs. This species seems to occur, though but sparingly, throughout the whole county of Wicklow wherever the perpendicular faces of rock, so common in the district, are shaded from the direct sunbeam, and kept moist by the tricklings from above. *Argyra argentata* also may be observed in the like haunts, gleaming like a snow-flake, as well as *Anthomyia riparia* and others of this family. More common still, and this particularly in the darkest niches, was *Clinocera bipunctata*, along with which *C. unicolor* also occurred, but much more rarely. Against a sheer wall of rock, up the valley of the Aughrim river, about a mile above the Wooden Bridge, under such circumstances, and half immersed in the dripping bath, numerous slender larvæ, of various growth, were weltering, which glided rapidly away, when disturbed, in serpentine tracks across the slippery precipice. I had no convenient means for rearing any of these, and so can merely conjecture that they belonged to Clinoceræ, without being perfectly assured they may not have been the progeny of some of the Nemocera.

The low salt marsh which stretches away north of Arklow Harbour, marked on the maps as the "Ferry Bank," afforded me a new species of Scatella (or Caenia, since that other genus of Desvoidy's might better be reunited to this), *Limnophora*, n. sp., *Culex cantans*, &c. In a rushy hollow of the tongue of sand intercepted between the sea and the shallow creek formed by the back-water of the river, I procured several specimens of *Thinophilus versutus*, in both sexes, of which the male had been previously known to me only by Bohemann's description.

Mr. E. Percival Wright (Honorary Secretary of the Association) having placed at my disposal his Memoranda of the past season's entomological collecting, I extract from them some notices which also relate to the neighbourhood of Arklow:—

"In the middle of July many specimens of *Nebria complanata* were obtained, lurking under the luxuriant fronds of *Asplenium marinum*, at the foot of the rocks on the coast, about three miles south of the harbour. They were not easily distinguished by the eye from the white sand and black stone which met here, and they seemed to seek concealment by thrusting their heads into the crevices of the rock, from which it became necessary to dig them out with the point of a knife. The admission of this species into the Irish Fauna previously rested on the authority of a single specimen, found many years ago by Mr. Furlong, in the same neighbourhood. On the verge of the sand-hills, which bound the Wexford shore south of Arklow Head, *Convolvulus soldanella* was growing in profusion. The blossoms, as they closed at sunset, imprisoned numbers of the pretty *Dasytes viridis*. These insects, impatient of the confinement, were observed to make their escape by gnawing a small hole in the blossom, close to the calyx. The sands adjoining Arklow Harbour on the north cease at a little stream, the same which feeds the Tiknock corn-mills. This threads its way to the sea in a very winding channel, among osier beds and tall thickets of *Juncus acutus*, its bed at times nearly choked by masses of *Alisma plantago*, or by the twining suckers of *Rosa spinosissima* and *Rubus*. Along the edge of the stream *Bembidium pallidipenne* was common, and every now and then *Cicindela campestris* took wing, quickly returning in a curve, like the flight of the boomerang, nearly to the spot from which it had been flushed at first. The woods of Shelton Abbey, which fringe the left bank of the Avoca river, and climb the overhanging hills for miles above the town of Arklow, afforded, as an addition to the Irish Fauna, *Malthinus biguttulus*, beaten out of the oak."

Mr. Wright notices also the occurrence of *Strangalia elongata* abundantly on Umbelliferæ in the Devil's Glen. I now turn again to my own entomological diary.

An hour's delay one afternoon, awaiting a train at Delgany Station, merely showed me that the shingly beach of Greystones had little to invite the entomologist at that season. The clay cliffs, which rise up directly from the beach north of the village, were baked almost as hard as bricks. Only in one spot, where a trace of dribbling moisture remained, I observed a few beetles, and among them a Bembidium, which seemed to present most of the characters by which it has been sought to distinguish *B. stomodes* from *B. rufipes*, to which, as a variety, Mr. Jacquelin Duval has reduced it.

The rest of my gatherings were made nearer to Dublin, and, that I may not take up too much time, I shall allude to but one or two of them. A very marked variety of *Cercyon littorale*, which I do not remember to have seen anywhere before, occurred this season, both on the Portmarnock shore (to myself), and on the North Bull sands, where it

was found by Mr. Furlong. In this variety, although mature in the black hue of the thorax, the elytra are pale-yellow, an oblong dark spot on each standing out in strong contrast, placed nearly as in *C. centrimaculatum*. On the sand-hills themselves *Chrysopa abbreviata* was more common than I had ever before found it; and, along with it, the freckled, sandy-coloured, stout larva, which, doubtless, feeds chiefly on the Aphides that abound on the sea-reeds. The salt marsh along the shore towards Baldoyle yielded *Canace nasica* pretty abundantly, the first time I had observed the species here, though common on some of the western coasts of Ireland; with this was *Glenanthe ripicola*, not very numerous, and a few of *Atissa pygmæa*.

In search of some coleopterous larvæ, I examined the North Bull sands more closely than I had done before. I was struck with the myriads of individuals belonging to a few species of Diptera which peopled the flat salt marsh on the landward side, where the sea-lavender (*Statice limonium*) grows in such profusion. *Madiza albipalpis* abounded in its favourite haunt, the blossoms of the sea-pink (*Armeria maritima*); infinitely more numerous, however, was *Leptomyza cinerella*, especially along the line where the mud passes into sand, with a scanty herbage of stone crop; neither was *L. gracilis* rare in that situation. In some dried-up rushy flats I met with *Campsicnemus pusillus*—by no means a common species in the British Islands—in company with the more common sorts, *C. scambus*, *curvipes*, *armatus*, &c.

On these sands I found, and have succeeded in rearing to the perfect state, the larva of *Nemotelus uliginosus*, of which I was enabled, by the same experiment, to determine *Alysia maritima* as a parasite. This fills up a gap in the natural history of the family Stratiomydæ, of which Nemotelus was the only indigenous genus the younger states of which remained unknown, at least I am not aware of any published account of it: yet it is singular if it be as I suppose, some of the species of this genus being exceedingly common in the British islands, as well as elsewhere.

In conclusion, I extract some further notes by Mr. Wright, made during the autumn, in the neighbourhood of Newcastle, county of Down:—

Notwithstanding the intense heat of the season, which, even tempered by the sea breeze, at the lower level about the village was often oppressive, the peak of Sliebh Donard, the highest of the Mourne mountains, which towers directly from the sea to an elevation of 2789 feet, was mostly wrapped in a fleecy mist; and on several occasions, when the ascent was accomplished, the cold at that height was so severe as speedily to cut short any attempt at collecting, and to compel a hasty descent for shelter. One day, more favourable in this respect, permitted a continuance for some hours on the summit, and rewarded the search with several specimens of *Calathus nubigena* from beneath the stones, which are strewed about the base of the great cairn, but only on the southern side of this, and within a very narrow space. *Arpedium brachypterum* was also found. The other Coleoptera observed were such as

commonly occur on all the Irish mountains:—*Nebria brevicollis* and *nivalis* (of the latter, both the red- and the black-legged varieties), *Carabus catenulatus*, *Byrrhus pilula*, *Othius melanocephalus*, *Homalota bolitochara*, &c. In the plantations about Newcastle *Cyphon deflexicollis* and *C. griseus* were abundant. A single specimen only of *Cleonus sulcirostris* occurred upon the sands below, where Mr. Furlong had previously found the species pretty numerous. The other Coleoptera observed there were mostly such as are common on the sand-hills of our coast, except one (*Byrrhus dorsalis*), which is an addition to the Irish Fauna. Early in August the sands were traversed by hosts of the larvæ of Coccinellæ; later in the season these had taken up their quarters on the thistles, where many of them fell victims to the attacks of the active Ichneumonidæ, which were continually running over those plants.

FRIDAY EVENING, JANUARY 16, 1857.

R. Ball, LL.D., President, in the Chair.

This meeting was specially directed to subjects connected with the Microscope.

The Minutes of last General Meeting having been read, were agreed to, and signed by the Chairman; after which

Wm. Archer, Esq., read the following—

CATALOGUE OF DESMIDIACEÆ.

The following list of the Desmidiaceæ which I have found about the "Feather-bed" and "Seechon" mountains, near Dublin, is not, of course, assumed to be a complete list. It is, however, a perfect one (with, perhaps, the exception of the genus Pediastrum) of the species I have met with in my limited experience; and I have no doubt but subsequent search will very much extend it. I have ventured to append to each species an opinion as to its frequency or rarity, which, I need hardly state, is to be interpreted as the result of my own experience only in a limited district. Some of those I have marked as rare may ultimately prove frequent. I am inclined to corroborate an observation made in Mr. Ralfs' beautiful "Monograph," as to the non-occurrence of the same species in the same pools from year to year. For instance, in the year 1855, a certain pool produced *Didymoprium Borreri* in great abundance. During 1856 I could not find a single specimen of that species; but its place was taken by a considerably less abundant development of *Hyalotheca mucosa*.

The "swarming" movement of the contents of the fronds of many species I have found to be very frequent. Mr. Ralf ssuggests these moving granules may be analogous to the zoospores of other algæ, and perform a similar function. The movement resembles somewhat that observable in the fovilla of pollen. If these granules be zoospores, and even a moderate proportion of the same should prove productive, should

we not expect to find the Desmidiaceæ in greater myriads in the waters they frequent than they really are? I have noticed the movement equally active in both the old and newly formed segments, and while even yet undergoing the process of division. I regret I have been only sufficiently fortunate to meet with the true reproduction of the Sporangia in these species.

Perhaps it may not be out of place if I add, with regard to the collection of the Desmidiaceæ, that I have found the most expeditious method of gathering the smaller species (which adhere, forming a cloud-like mass round the leaves of plants or similar foreign objects) to be, to bring a small phial under the water, gently to push the blade of grass or sedge, or other such object, into it, snip it off, and thus retain the Desmids adhering, rather than to strip the plant with the hands, frequently rather a tedious and difficult process. The larger species I have found more abundant, not in the deeper pools, but rather in shallow water, an inch or two in depth, and in which there exists a very slight trickle of water permanently throughout the summer.

In regard to precise localities for the species mentioned in the list, I regret I cannot be more definite. Along the "Piperstown Road to Glencree," there are a number of pools, as well as on each side of the "Military Road" over the "Feather-bed Mountain," and these, with the few exceptions mentioned in the list, produced all the species which I have had the pleasure to meet with. Most ponds and streams produce some species, especially of the genera *Closterium*, *Cosmarium*, *Scenedesmus*, *Ankistrodesmus*, and others.

LIST OF DESMIDIACEÆ FOUND IN THE NEIGHBOURHOOD OF DUBLIN.

Hyalotheca dissiliens (*Smith*), abundant.
,, mucosa (*Mert.*), ,,
Didymoprium Borreri (*Ralfs*), not uncommon.
Desmidium Swartzii (*Ag.*), rare.
Sphærozosma excavatum (*Ralfs*), rare.
Micrasterias denticulata (*Breb.*), common.
,, rotata (*Grev.*), ,,
,, papillifera (*Breb.*), not uncommon.
,, Americana β (*Ehr.*), rare.
,, oscitans (*Ralfs*), ,,
,, crenata (*Breb.*), not uncommon.
,, truncata (*Corda*), ,,
Euastrum verrucosum (*Ehr.*), rare; base of "Seechon" Mountain.
,, crassum (*Breb.*), not uncommon.
,, oblongum (*Grev.*), common.
,, affine (*Ralfs*), not uncommon.
,, ampullaceum (——), rare.
,, didelta (*Turp.*), frequent.
,, ansatum (*E.*), ,,
,, pectinatum (*Breb.*), not rare.
,, rostratum (*Ralfs*), rare.

Euastrum elegans α (*Breb.*), frequent.
,, binale (*Turp.*), not uncommon.
,, sublobatum (*Breb.*), rare.
Cosmarium cucumis (*Corda*), not common.
,, pyramidatum (*Breb.*), ,,
,, bioculatum (*Breb.*), ,,
,, granatum (*Breb.*), rare.
,, Meneghinii (*Breb.*), not uncommon.
,, crenatum (*Ralfs*), rare.
,, tetraopthalmum (*Kutz.*), rare.
,, botrytis (*Bory*), not uncommon. [I met with in the canal water a form, probably a variety of *C. botrytis*, which, like it, is rough with pearly granules, but differing in having the deep constriction not forming a linear notch on each side in the front view; but wider at the outside, causing the angles at the base of the segments to be more rounded; the segments broadest at the base, and gradually narrowing towards the abruptly truncate ends in a *concave* manner, thus somewhat pointing away from each other at the lower angles of each, while the angles at the ends are more acute and defined than in *C. botrytis*. The end view is narrow elliptic.]
,, margaritiferum α & β (*Turp.*), frequent.
,, Brebissonii (*Menegh.*), not unfrequent.
,, cælatum (——), rare.
,, cylindricum (*Ralfs*), rare.
,, cucurbita (*Breb.*), ,,
,, phaseolus (*Breb.*), ,,
Xanthidium armatum (*Breb.*), frequent.
,, aculeatum (*Ehr.*) not uncommon.
,, cristatum α & β (*Breb.*), rare.
,, fasciculatum α (*Ehr.*), ,,
,, octocorne α (*Ehr.*), frequent. [My opinion is that *Xanthidium octocorne* (var. α), so called, should more properly come under the genus Arthrodesmus, slightly extending the characters of the latter, so as to embrace the organism in question. Xanthidium appears a very natural genus; but *X. octocorne* seems out of place in it. Its affinity to some forms of *Arthrodesmus incus* cannot but be apparent. I have met with both species mixed in abundance.]
Arthrodesmus convergens (*Ehr.*), not uncommon.
,, incus α & β (*Breb.*), not uncommon.
Staurastrum dejectum, α, β, & γ (*Breb.*), frequent.
,, cuspidatum (*Breb.*), not unfrequent.
,, Dickiei (*Ralfs*), rare.
,, muticum (*Breb.*), not rare.
,, orbiculare (*Ehr.*), not uncommon.
,, tumidum (*Breb.*), rare ["Seechon" mountain.]

Staurastrum margaritaceum (*E.*), rare.
,, punctulatum (*Breb.*), not uncommon.
,, hirsutum (*Ehr.*), common.
,, teliferum (——), rare.
,, polymorphum (*Breb.*), not uncommon.
,, tricorne (*Breb.*), common.
,, controversum (*Breb.*), not uncommon.
,, paradoxum (*Meyen*), ,,
,, brachiatum (——), rare.
,, alternans (*Breb.*), ,,
,, asperum β (*Breb.*), ,,

[I have met with a form of Staurastrum bearing some resemblance to *S. spinosum*, or rather between that species and *S. avicula*. The spines at the angles are forked to the base, and not merely at the extremities, and the intermediate spines are smaller than *S. spinosum*. The form agrees much better with the figure of *S. avicula*, provided that species had intermediate spines, than with that of *S. spinosum*. It is not uncommon, according to my experience, in the district to which this list appertains.]

Didymocladon furcigerus α (*Breb.*), rare. [Slow stream between Roundwood and Devil's Glen. May be more common, however.]
Tetmemorus Brebissonii (*Menegh.*), common.
,, granulatus (*Breb.*) very common.
Penium margaritaceum (*Ehr.*), not uncommon.
,, cylindrus (*Ehr.*), ,,
,, digitus (*Ehr.*), very common.
,, Brebissonii (*Menegh.*), ,,
,, closterioides (——), rare.
Docidium nodulosum (*Breb.*), not uncommon.
,, truncatum (*Breb.*), ,,
,, clavatum (*Kutz.*), ,,
,, Ehrenbergii (——), common.
,, asperum (*Breb.*), rare. [Should a master-hand ever propose the erection of a new genus for the reception of this species, or its removal from Docidium, the step would meet with my approval. To my mind it is *not* a Docidium: it entirely wants the characteristic constriction of that genus, and I have looked carefully, but in vain, as Mr. Ralfs did, for terminal moving globules. I have found occasionally three or more individuals adhering end to end, like a filamentous conferva, with extremely long cells. The specimens I have met with were rather more dilated at the ends than is represented in Ralfs' figures.]

Closterium lunula (*Müller*), common. [This is a favourable species for observing the circulation. It is not, however, like that phenomenon in other vegetable cells, the current being

here of a very fitful and irregular character. It possibly bears some relation to the movement of the free granules at the ends of the frond. I have scarcely ever found any difficulty in detecting it.]

Closterium lanceolatum (*Kutz.*), not common.
,, acerosum (*Schrank*), not uncommon.
,, turgidum (*E.*), ,,
,, Leibleinii (*Kutz.*), common.
,, Dianæ (*Ehr.*), ,,
,, didymotocum (*Corda*), not uncommon.
,, striolatum (*E.*), very common.
,, attenuatum (*E.*), rare.
,, juncidum (——), ,,
,, rostratum (*Ehr.*), ,,
Spirotænia condensata (*Breb.*), common.
Ankistrodesmus falcatus (*Corda*), very common.
Pediastrum tetras (*Ehr.*), not uncommon.
,, heptactis (*Ehr.*), ,,
,, Boryanum (*Turp.*) ,, [I have met (rarely) in two or three of the cells the contents receded from the walls, and massed together into a single, globular, green body in the centre, so as to leave the remainder of the otherwise normally formed cell quite empty. This took place in the outside row of, and not in neighbouring, cells. This body is possibly a gonidium destined for the propagation of the organism. I have seen somewhat similar bodies in the cells of a species of Spirogyra, *not* the result of conjugation.]
,, ellipticum (*Ehr.*), common.
Scenedesmus quadricauda (*Turp.*), very common.
,, obliquus (*Turp.*), not uncommon.
,, obtusus (*Meyen.*), ,,

The Members then proceeded to ballot, when the following were elected:—As Honorary Member, Captain M'Clintock, R.N.; as Corresponding Members, C. C. Babington, F.R.S., and Professor the Rev. J. S. Henslow; as Ordinary Members, John Barker, M.D., Stephen Gwynne, A.B., and John Irvine Whitty, LL.D.; and as Associate Members, William Archer and Vere Webb M'Nally.

The President then left the Chair, and the meeting resolved itself into a Conversazione.

Professor Harvey exhibited various vegetable organisms and tissues under the microscope, and many interesting species of microscopic algæ. Mr. Callwell and Mr. Yeates exhibited specimens of the Rotifera and other animalcules, as also the circulation of the cell-sap in plants. Dr. Barton exhibited the circulation of the blood corpuscles in the web of a frog's foot. Dr. Carte, various sections of coal from the Arctic regions, brought home by Captains Sir R. M'Clure and M'Clintock. Mr. A.

Furlong, many interesting entomological preparations. Professor W. Smith, of Queen's College, Cork, sent for exhibition twenty-four slides of Diatomaceæ, collected on his recent tour to the Pyrenees, and also from China, the Red Sea, &c. Dr. Sawyer brought a series of objects for exhibition with polarized light. Messrs. Burchall, Archer, and others, also brought various microscopic subjects; and, after some hours spent in the investigation and examination of the numerous and beautiful objects exhibited, the meeting was adjourned to the 25th of February.

WEDNESDAY EVENING, FEBRUARY 25, 1857.

R. Ball, LL.D., President, in the Chair.

The Minutes of last General Meeting having been read, were signed by the Chairman.

"The Entomologist's Annual for 1855," second edition, by H. T. Stainton, from Lieutenant Crozier, R.E., was acknowledged, and thanks ordered to be given to the donor.

KINGIA AUSTRALIS.

Dr. Harvey exhibited a trunk of *Kingia Australis* (R. Br.) which had been presented to the College Herbarium by C. Moore, Esq., Director of the Botanic Gardens at Sydney, and took occasion to make some remarks on the distribution and structure of this remarkable type, contrasting it with Xanthorrhœa, &c. The Kingia is found in Western Australia, from King George's Sound to Cape Riche, and in a few isolated spots of the Darling Range, and also on the sands in the plain, not far from the Swan. It generally grows in clumps, and has a striking effect in the landscape, particularly when in full foliage, if it have escaped the annual bush-fires. The trunk in this case is cloaked with the deflexed persistent brown leaves of previous seasons; while its head is crowned with the silvery leaves of the current year, and the numerous heads of flowers stand amid the foliage, in a circle, like the rays of a crown. In botanical systems Kingia is either placed at the end of Juncaceæ, or made the type of a small order, called Kingiaceæ, including Baxteria and Dasypogon—two other genera, natives of Western Australia. The growth of the trunk in Kingia is very slow, and the specimen exhibited, which is about ten feet high, may probably be some hundreds of years old.

After some conversation, A. H. Haliday, Esq., A.M., V.P., read from Professor W. Smith, F.L.S., Corresponding Member—

MEMORANDA, CHIEFLY BOTANICAL, OF AN EXCURSION TO THE PYRENEES IN THE SUMMER OF 1856. PART II.

(*Continued from* p. 16.)

We left Biarritz on the 3rd of July *en route* for Pau. A delay of a few hours in Bayonne enabled me to take a short ramble in the environs. A public promenade, handsomely planted and well kept, a luxury for

the pedestrian rarely wanting in a French town of any pretensions, extends west of Bayonne for a mile or more along the banks of the Adour. Its sandy sides were profusely covered with various Leguminosæ, and supplied me with good specimens of *Trifolium incarnatum, T. resupinatum, T. patens, Ononis natrix,* and *Melilotus arvensis.*

Leaving Bayonne at 7 P. M., we reached Pau at 5 A. M. of the 4th of July. The night was spent in such comfort as could be afforded by the coupé of a diligence, a full half of which was occupied by an *exigeante* Spanish signora on her way to the baths of Panticosa. The dawn was watched with interest, bringing, as it happily did, relief from our confined position, and a magnificent view of the snow-capped summits of the Pyrenean range, gloriously filling up the landscape to the south and east; the northern slopes lying in the deep shades of night, while the stainless peaks glittered in the rosy light of the rising sun.

At the distance of more than ten leagues, the mountains appeared to be within a few miles of our road, giving us a first example of the deceptive nature of the impressions of magnitude and extent conveyed to the eye by unaccustomed elevations, such as those now before us; indeed, it was some days before we could understand that what seems a mile in these mountains must be taken as a league, and the hill of a few hundred feet in apparent height was a mountain of as many thousands!

The approach to Pau from Bayonne is interesting, notwithstanding the monotonous nature of the road, which for the last six miles is a perfectly straight and level avenue of poplars.

The town is built upon a knoll of considerable elevation, embosomed in trees, and crowned by its fine old chateau, venerable not merely from its age, which dates from the beginning of the fourteenth century, but from its associations as the birth-place of Henry IV., the refuge of Calvin, and the stronghold of Protestantism on its first establishment in France.

A couple of days sufficed to enable us to visit the chateau, and become familiar with the chief objects of curiosity in this ancient capital of Navarre.

The main interest of Pau lies in its situation, commanding as it does a full view of the mountains, which stretch in an unbroken line of more than sixty miles along the southern horizon.

This view is too distant—being upwards of twenty-five miles—to give a very accurate idea of either the elevation or extent of the range, but it gains rather than loses by familiarity, and the play of the lights and shadows upon the summits, flanks, and valleys of the mountains secures a perpetual change and variety of aspect, which presents fresh charms and beauties upon every inspection. Unquestionably, the English invalid, if not profiting by the proverbial calm of the mild and serene atmosphere of Pau, may at least find materials for soothing contemplation in the lovely landscape included in this magnificent panorama.

Our first close acquaintance with the mountains was made at Eaux Bonnes, and Eaux Chaudes, the approach to which from Pau, though

not perhaps through the finest valley or deepest gorges of the range, yields to none in many points of sublimity and interest, and, having been the first seen, has left the deepest impressions of novelty and admiration.

Many of the French watering-places of the Pyrenees lie in the recesses of deep mountain valleys, opening to the north, and formed by torrents which are fed by the snows or glaciers of the highest peaks. These valleys often contract into mere gorges, deeply cleft in the mountain's sides, which only afford a scanty water-course for the rushing stream. The construction of roads passable for carriages to the higher part of such gorges, and the sources of the mineral springs, has taxed the skill of the most eminent engineers, and the result has been the formation of paths, often cut as mere shelves in the overhanging rocks, and offering all the charms of wonder, fear, and sublimity.

The towns I have just mentioned lie in gorges of the Pic du Midi d'Ossau, whose streams unite to form the Gave d'Ossau. The valley of the Gave, up to the base of the mountain, is of considerable width, but suddenly contracts at Laruns, near which is the confluence of the streams which descend from Eaux Bonnes and Eaux Chaudes, and the ascent from thence is only to be accomplished through the gorges leading to these towns, each about three miles distant. Both gorges are fine, but the features of the one leading to Eaux Chaudes are the more grand and imposing, and the triumph of art and skill over the natural difficulties of the route challenges the wonder of the most indifferent traveller. The respective positions of the two towns render any direct intercourse between them impossible, the crest of the intervening mountain being only accessible on horseback or on foot. Carriage travellers must, therefore, retrace their way down one gorge, and ascend by the other, thus more than doubling the distance to be traversed. This is the case with many of the Pyrenean baths, the hardy pedestrian or bold horseman being often able to save ten, fifteen, or even twenty miles, by passing over the *cols* of the mountains; while the more luxurious traveller has to return to the plain, and make the circuit of their bases.

We first mounted to Eaux Bonnes, whose waters deservedly maintain a high repute for the arrest or cure of incipient cases of pulmonary consumption. The village is small, but most beautifully situated in a perfect *cul de sac*, completely imbedded in a mountain recess, which affords scanty room for the bathing establishment and some half dozen large and pretentious hotels. The walks and cascades in the vicinity are numerous and romantic, and the thickets well stored with flowers and ferns. *Saxifraga aizoides*, *Oxalis corniculata*, and *Meconopsis cambrica*, were among the number I observed; and I here, for the first time, gathered in a living state, and in great profusion, *Polypodium phegopteris*, and *P. dryopteris*. "The rarity" of Eaux Bonnes, *Lithospermum Gastoni*, Adolphe D. C., named in honour of Gaston Saccaze, a local guide, who first detected it, escaped my search. It is a plant allied to *L. purpuro-cæruleum*, but said by M. de Candolle to be per-

fectly distinct, and to have been found only in this spot.—(Geogr. Botan. 1855, page 587.)

A few hours having been devoted to Eaux Bonnes, whose hôtels were crowded with patients, and offered poor accommodation to the mere passing traveller, we returned to the valley, and ascended the gorge leading to Eaux Chaudes, finding at the Hôtel Baudot a pleasant welcome and comfortable apartments. This small village, for it scarcely deserves the name of town, is less romantically placed than Eaux Bonnes. The gorge is narrow, but offers sufficient space along one of its borders for a narrow street, which might, if required, be extended, a good carriage road having been formed on a gradual ascent towards Gabas, six miles further up the mountains. This road, as a mule path, is further continued over the mountains into Spain, and is much frequented during the summer months, not merely by invalids *en route* for Panticosa, but by thousands of muleteers, who carry on a legal or contraband trade in French and Spanish merchandise.

We rode up the next day to Gabas, at the base of the highest ridge of the Pic du Midi d'Ossau, hoping to gain a near view of this, one of the monarchs of the Pyrenean range; but, to our great disappointment, a dense fog enveloped the mountain summit, and refused to withdraw its white veil of impenetrable gauze during our brief halt at its feet, most provokingly uncovering the beauties it concealed when we had again returned to our hotel, and could view them at the respectful distance of some eight or ten miles. The form of this mountain is that of a cone, with a double or forked peak: its height is 7500 feet, and, with its glistening snows, even at the distance of Eaux Chaudes, it forms a very beautiful termination to the landscape.

For several miles the road towards Gabas skirted forests of pine, and rocky knolls covered with thick shrubberies of box; and while our ponies were baited at this mountain hostelry, we wandered into the woods, and collected a few interesting plants. Among these were excellent specimens of *Asplenium septentrionale*, a fern of rare occurrence in the highest mountainous districts of Wales and Scotland, but which here occupied every rocky crevice.

Before leaving Eaux Chaudes we noted the conspicuous manner in which the abrupt sides of the gorge exhibited the line of junction between the limestone and the granite rocks of the higher ridges of the mountain. At this line originate the hot springs of the bathing establishment, which is well supplied by numerous sources, the temperature of the principal being about 95° Fahrenheit. They are much resorted to by those who find the stronger waters of Eaux Bonnes unnecessary in mild cases of rheumatism or bronchitis.

From Eaux Chaudes it was possible to pass, on foot or horseback, by a mountain path to Argelez, and thus reach Cauteretz, our next destination: the distance by this route is about twenty-five miles. To avoid parting from our baggage, however, which we would have been obliged to trust to the care of strangers, we preferred making the necessary

detour, and, by resting the night at Pau, accomplished the journey of sixty-eight miles in two days, without fatigue or inconvenience.

The drive from Pau to Cauteretz is mostly through a level country, producing rich crops of maize. It is not until approaching Argelez that the proximity of the mountains gives the true Pyrenean character to the landscape.

The valley of Argelez is highly extolled for its sylvan beauties, and is, doubtless, a lovely spot in the eyes of the agriculturist, teeming, as it does, with the richest products of his labour; but, to the seeker for mountain scenes, it offers little to arrest his steps, as the immediate circle of hills are only outliers of the great chain, and are of comparatively slight elevation.

The valley is about ten miles in length, and two or three in width, and is completely surrounded by grassy hills, which conceal from the view all the higher peaks of the mountains.

Although 1600 feet above the level of the sea, the situation is so sheltered that the climate in winter is as mild as that of the plain below, while the heats of summer are tempered by the shadows and breezes of the neighbouring hills. I should doubt, however, if these circumstances were equally favourable to health as to vegetation; for, amid all its floral and cereal luxuriance, we noticed that the peasants of Argelez were pallid and aguish-looking, and that the gôitre was not unusual among the older women.

At the southern extremity of the valley, near the village of Pirrefitte, I found growing in profusion the lovely *Adiantum Capillus-Veneris*, vouching for the mildness of the air and equability of temperature. This fern, which I have gathered in abundance on the shores of the Mediterranean, and which is said to be widely distributed over the tropical regions of the globe, is seen only sparingly in Britain, in the neighbourhood of the southern coasts; and in Ireland it is almost confined to the south Isles of Arran, where it finds a congenial atmosphere in the soft mists and temperate winds that accompany the gulf-stream from the shores of Mexico and Bermuda.

At Pirrefitte the valley of Argelez narrows into a bifurcated gorge, one branch of which leads to Luz, and, again dividing, passes upwards to St. Sauveur and Baréges; the other branch ascends to Cauteretz, and through this we mounted, at a very slow pace, to this little Pyrenean metropolis, distant from Pirrefitte about seven miles, 1900 feet above this village, and having 3300 feet of absolute elevation. It is placed in a small but beautiful basin, closely hemmed in on all sides but the one by which we entered, by lofty mountains that rise abruptly from the very doors of the houses, and tower into the sky until their snowy peaks are lost in the clouds.

The Peak of Monné, to the west, has an elevation of 9100 feet; that of Péguére, to the south, 7415 feet; and that of Percante, to the east, 6500 feet. So completely is Cauteretz overhung by these lofty and abrupt barriers, that, at the time of our arrival, not far from the longest day of summer, the hour of sunrise to the valley was 8 A. M., and the hour

of sunset half-past 4; and although the weather was unusually hot in the south of France during our stay, yet the long, cool twilight, secured by the shadows of its encircling hills, rendered the mornings and evenings at Cauteretz most deliciously favourable for out-door occupations.

One of our excursions from Cauteretz, where we remained three weeks, was to the Pont d'Espagne and Lac de Gaube,—visits quite, and deservedly, the mode with all English visitors, and not a few French ladies and gentlemen who can ride along the edge of precipices, or walk twelve or fourteen miles over a path which mainly consists of pitfalls and boulders. But it well repays the risk and exertion necessary. The romantic beauty of the Pont, the wild solitude of the Lac, the depth of the gorge, its irised cascades, with their reverberating echoes, and the silvan beauty of the pine forests that line the route to those more elevated spots, are beyond all praise, defy all description, and leave reminiscences that can never be forgotten.

The Lac de Gaube is a sheet of the purest snow-water, 270 feet deep, and three miles in circumference, lying at the base of the Vignemale, whose glaciered sides tower aloft to the height of 11,043 feet, while its snows dip down to the very edge of the water. The lake itself is 5840 feet above the level of the sea. Its temperature, which I tested with a portable thermometer, was 48° Fahr., the external air, under the influence of a brilliant sun, being 64° in the shade. The coldness of the lake accounts for the absence of ordinary aquatic vegetation—no plants, save a few Diatomaceæ, appearing to be able to flourish in the clear depths of these mountain waters.

Within a few feet of the edge, I found magnificent plants of the *Gentiana lutea*, with its rich pyramid of golden flowers; the rare *Swertzia perennis* was not far distant; and the beautiful parsley fern, *Allosoros crispus*, was abundant on the rocky ground.

The tomb of a young English couple, who perished in the lake a few days after their marriage, by the upsetting of the frail skiff of the peasant who resides here during the summer, is erected upon a little island close to the eastern shore, adding not a little to the sentimental charm of this lonely spot. The real history of this disaster will, no doubt, one day fade into a legend, to suggest a romance, or embellish a poem.

In returning from the Lac de Gaube we were overtaken by a thunderstorm, accompanied by vivid flashes of lightning, and hailstones of an extraordinary size and form: the latter were about an inch long, and half an inch in diameter at one end, gradually narrowing to the other; they thus bore a close resemblance to an egg, though tapering more to the smaller end, and were quite as large as those of a sparrow or chaffinch. This storm added not a little to the magnificence of the scenery around, though not contributing to the comfort or security of the journey: we reached our hotel in safety, however, after a day of varied and unalloyed enjoyment.

Another excursion from Cauteretz, presenting fewer attractions and greater difficulties, is that to the Lac d'Estom, at the head of the valley Lutour, about five miles to the east of Lac de Gaube, from which it is

separated by the lofty ridge of Mount Pechineya. The distance from Cauteretz to the lake is about ten miles; half of the way may be accomplished on horseback, the remainder must be performed on foot.

The gorge leading to Lac d'Estom is full of wild and romantic beauties, its mountain boundaries on either side being often perpendicular, and streaked with snow; but the grand old pine forests which guard the way leading to the Pont d'Espagne are almost entirely wanting here, and the rude monotony of the scene becomes wearisome to the jaded pedestrian. The lake itself has a somewhat higher elevation than the Lac de Gaube, is smaller, and more closely hemmed in by the mountains, but offers a scene of singular wildness, not without its charm. The principal sheet of water is fed by a stream proceeding from a smaller lake 2000 feet higher, and this one, lying among perpetual snow, presents the singular features of a smooth, frozen surface of ice even under the heat of a July sun. It is only during the early days of August that its icy covering fairly melts, to be renewed, for the next eleven months, in the beginning of September.

The ascent to the smaller lake, known as Lac Soubiran, is difficult and dangerous, and I did not attempt it; but Dr. Taylor assured me that he had verified the above account, and seen the lake completely frozen over on the 6th July, 1843. The relative popularity of the excursions to the Lac d'Estom and Lac de Gaube may be judged of by the fact that, on our excursion to the latter, we were joined by, or encountered on the way, some five-and-twenty co-excursionists, among whom were nuns and priests, Spanish hidalgos and German burgomasters, English dandies and French flaneurs; while I performed the trip to the Lac d'Estom accompanied only by my boy guide, and without meeting a single person on the route. I was obliged to leave my guide with the ponies at the termination of the last portion of the path passable for an equestrian, and make my way alone, guided by the torrent to the lake from which it issued. Here I was suddenly accosted, as I crept round a jutting rock, by a mountain shepherd, whose wild dress and wilder patois, however they harmonized with the scene around, at first view inspired fear rather than satisfaction. He proved, however, a very civil and intelligent companion, assisted me in collecting Diatomaceæ, by scraping off the scum which adhered to the surface of the stones, no doubt very much pitying my unaccountable pleasures in carefully bottling such rubbish: afterwards took me to his hut or cave, and there regaled me upon milk and brown bread, the first, fresh from his mountain herd, and the second, though somewhat hard and stale, sufficiently palatable after the toilsome march I had just accomplished. He told me that he rarely saw a stranger in these mountain solitudes, where he resided for about four months of the year, pasturing his cattle upon the slopes around; and that he went down once a fortnight to Pirrefitte, a distance of sixteen miles, and 5000 feet below, to hear the news of the world, and to bring up upon his back the bread and meat sufficient for the consumption of himself and a fellow-shepherd.

The stones of the stream, as it issued from the Lac d'Estom, were

covered with the rich brown tufts of a *Hydrurus*, one of the forms of Palmellacean Algæ, probably *H. Vaucherii*, Kuetz. The same species occurs in the river Lea, as it issues from Gouganbarra Lake, in the west of the county of Cork; and I have noticed and collected it abundantly in streams near Lenane, in Galway, at high elevations on the Tonabrick mountains.

Singularly enough, the immediate neighbourhood of Lac d'Estom also furnished me with specimens of *Pinguicula grandiflora*, another Irish plant whose restricted distribution in the south-west of our island has always attracted the notice of the botanist. Familiar as I have been with its appearance in the neighbourhood of Cork, where it reaches its most eastern British habitat, I was much gratified by detecting it in this remote locality, probably near its original centre of creation. The theory of Professor Forbes recurred to my recollection, and I recognised in this lonely flower a satisfactory corroboration of his ingenious speculations on the distribution of plant life, and the parentage of our British Flora.

Close to Lac d'Estom I also obtained fine specimens of *Aspidium lonchitis*, a beautiful fern, only known to British botanists by rare specimens occurring on the highest mountains of Scotland and Ireland, and in England and Wales confined to one county in each. Of this species, and *Allosoros crispus*, I here collected several roots, which have survived the journey homewards, and are now alive in the garden of Queen's College, Cork.

I must not forget to mention one redeeming feature in the rude chaos of rocks and stones which surrounded the Lac d'Estom,—the numerous little groves of *Rhododendron ferrugineum*, which formed little oases of green amidst the gray waste around. I was too late to see this beautiful shrub in full perfection, but the brilliant crimson of the few remaining flowers strikingly contrasted with the dull green of its foliage, and told with what splendour it must, at an earlier season, have decorated its desert home.

The immediate neighbourhood of Cauteretz furnished me with valuable additions to my herbarium, too numerous to be here noted in detail. I may, however, mention a few of the more common and conspicuous plants, that must, from their home rarity and beauty, attract the attention of any one accustomed only to the Flora of the British Isles. *Dianthus monspessulanus*, with its pink circlet of fimbriated petals, was everywhere abundant; the deep blue of *Prunella grandiflora*, and the paler hue of *Viola cornuta*, adorned every little thicket, and the membranous bracts of *Astrantia major* shone conspicuously in the meadows. The campanulas were equally numerous in the woods; the mountain defiles were green with the singular *Cynanchum vincetoxicum*, while the rocks were profusely covered with Saxifrages and Sedums, many of the species found only on our highest mountains, and rare even there, or else quite unknown to our Flora.

Not being able to ascend to the loftier summits of the mountains around, I sought for some local botanist who could aid me in procuring

the more Alpine plants of such localities, and was fortunate enough to meet with an old shepherd who had sufficient knowledge of flowers and interest in their study to assist me in my views. He obtained for me, from the most elevated ridges of the Monné, a good-sized box of specimens, that furnished me with many truly Alpine forms:—*Ranunculus Pyrenæus, Dryas octopetala, Hutchinsia Alpina, Gentiana acaulis,* and *G. verna; Galium Pyrenaicum, Androsace villosa,* and *A. carnea; Primula integrifolia,* and *Erinus Alpinus; Paronychia serpyllifolia,* with its curiously silvered bracts, amid which nestled its half-concealed flowers. These, together with superb pyramids of *Saxifraga cotyledon,* and many other novelties, attested the diligence of my collector, and warrant my recommendation of his services to future travellers. His name is Michael Lacarret; he is well known in Cauteretz, and a good specimen of the Pyrenean shepherd, with his stalwart frame, his flowery locks, and characteristic *berret.* He is well to do in the world, and resides, with his flock, in winter, at Coarraze, near Pau, accompanying them and his servants, in the summer, to the lofty pasturage of the Monné and the Maillardon.

The arable land around Cauteretz was chiefly devoted to the growth of hay, and the numerous mountain streams were ingeniously applied to purposes of irrigation. Two, three, or even four crops are not unusually the results of the care bestowed upon the land.

At this high elevation meadows of maize, which equally profit by frequent irrigation, were not unusual, indicating the high average temperature of the summer, and the dryness of the air in this mountain valley. Even in the milder atmosphere of the southern counties of England and Ireland, possessing a far higher average temperature than Cauteretz, the growth of this valuable grain is impossible, or unremunerative, from the greater amount of moisture in the air, and less powerful heat of the summer sun.

Of the animal productions in the environs of Cauteretz I can only speak in general terms. Stuffed specimens of the chamois (here called the izzard), and excellent venison furnished by its flesh—not an unfrequent dish at our table d'hôte—were my only opportunities of forming an acquaintance with this wary little antelope, that can only be seen alive on the most inaccessible peaks of the Vignemale. The *Mygale Pyrenaica* is an object of curiosity to the inhabitants themselves, and the ibex and the bear, though undoubted natives of these mountains, are fast approaching the fate of the wolf of Britain. Insect life was more abundant and noticeable. The order Hemiptera seemed to have numerous representatives; and Orthoptera, of the family of the Gryllidæ, with green, blue, and scarlet wings, flitted on every rock; the stag-beetles were frequent in the Parc; and every sunny dell was enlivened by the rich colours of numerous, and to the English collector rare, species of the butterfly tribe. Of the latter I easily procured as many specimens as I could conveniently and safely pack away of the Apollo, the Machaon, the Morio, and other smaller, but not less beautiful, forms.

On the great source of repute to Cauteretz—its mineral springs—it

is unnecessary to dilate: their curative virtues have deservedly elevated this place from the position of a mountain village to a town, consisting, during the season, of not less than 4000 inhabitants, and its increase is still rapid and constant.

All the open sources here are prolific of that curious substance known as "Barregene," which collects in a thick, unctuous stratum, variously coloured—red, green, and yellow—along the sides of the little water-courses that lead from the springs. The nature of this material has been variously described as animal, vegetable, and mineral. It is only found in water of a sulphurous character, and its organized constituents are wholly microscopic. A careful examination of it, in a fresh state, convinced me of its purely vegetable nature. I found it wholly composed of minute algæ, in various stages of growth or decay, and easily determined the species as belonging to the genera Leptothrix, Phormidium, and Oscillatoria.

We left Cauteretz with regret on the 30th of July, intending to proceed, by way of St. Sauveur and Bagrées, to Bagnères de Bigorre and Bagnères de Luchon, on the eastern Pyrenees.

Mr. E. Percival Wright read, for Robert Warren, Jun., Esq., Corresponding Member, the following—

NOTES ON THE NATATORES OF KILLALA.

Wild Swan (*Cygnus ferus* or *Bewickii*).—Wild swans are frequently seen on the wing, but I have never seen them alight in the bay or river. On some of the Erris lakes it is said they are to be seen every winter. In the winter of 1855-56 they were very abundant in Erris. A party of gentlemen visiting that district in February, 1856, saw upwards of forty in one day. A pair were shot there this winter, but as I did not see them, I cannot say whether they were bewicks or the wild swan.

Bean Goose (*Anser segetum*).—A fine bird of this species, wounded in the wing, became quite domesticated in the poultry-yard of its owner in the town of Ballina, where I often admired its elegant and graceful carriage, showing such a contrast in appearance to the tame geese, its companions in captivity.

White-fronted Goose (*Anser albifrons*).—Many large flocks of this species frequent the extensive bogs in Mayo and Sligo; when on their flight across the Moy, I have often recognised them by their white foreheads and barred breasts, but I have never known any to alight on the Moy, although I have sometimes seen them flying within a few yards of the water.

Shelldrake (*Anas tadorna*).—This fine bird may be seen during winter on the sandy flats of the Moy that are bare at low water; a small flock of eight or ten birds frequent the banks of the Sligo side of the river, near Scurmore; but it is impossible to shoot them, they are so wary.

Wild duck (*Anas boschas*).—Is seen in very large numbers; during winter they do not associate with the widgeon, but keep in large flocks by day at the north side of Bartra, just outside the surf that is always beating on that side of the island; when the weather is stormy, they lie on the sandy shore. At night they fly inland to the feeding-ground, the various springs and wet bottoms, and at daybreak they may be seen returning in little flocks to their resting-place. They suffered the most of any of the duck tribe during the great frost of 1855, near the village of Ballisokeery; several were taken by boys when unable to fly, from weakness occasioned by the long-continued frost. I once found two of their nests, containing eight and nine eggs, on a little island in a bog lake, the island was almost covered with nests of the black-headed gull; but although the ducks and gulls were both hatching, they did not appear to molest each other.

Gadwall (*Anas strepera*).—This rare duck I have seen on two occasions: first near Scurmore, on the sands at low water, I saw five feeding, when I made an unsuccessful attempt at shooting them. I saw them again on the 6th of March, 1856, when I shot an adult pair, out of a flock of seven or eight birds, as they were feeding in company of some widgeon on the Moyview strand; the patch of buff on the tail-coverts of the male, and the peculiar position in which they carried their flat bills, induced me to aim at them rather than at the widgeon, of which two also were killed by the same shot. There was but one other male gadwall in the flock, showing the buff tail-covert.

Pintail (*Anas acuta*).—This elegant and graceful duck frequents the river in limited numbers, and associates with the widgeon on their feeding-grounds, where seven or eight adult males may be seen any day during winter or early spring. I shot a very fine pair, male and female, from amongst a flock of widgeon near Bartra last December.

Common Teal (*Anas crecca*).—Is seldom seen in any numbers, unless when driven by frost from the bogs and inland waters, but the flocks of fifty or a hundred birds may be seen on the tidal portion of the river, where they remain until the frost disappears; but on the night succeeding that event they all, with the exception of a few stragglers, depart for their usual inland haunts. Although of comparative easy approach when inland, it is one of the most difficult birds to shoot when on the sea-shore.

Widgeon (*Anas Penelope*).—In very large numbers frequent the sands of the Moy during winter and spring; some are seen as early as September, but the great body of them do not make their appearance before the middle of October; they take their departure some time in March, but a few remain until the first or second week in April. During winter they feed on the zostera, called by the peasantry widgeon-grass, but the supply of that being exhausted early in spring, they then feed chiefly on the laver or sloke, which at that time of the year is exceedingly abundant on all the stony and rocky shores.

Scaup (*Fuligula marila*).—I have occasionally seen a few stragglers in winter, and shot a single specimen.

Pochard (*Fuligula ferina*).—The foregoing remarks may also be applied to this species.

Black Scoter (*Oidemia nigra*).—One day last month, near Bartra, a pair of black ducks flew close past me, and as they were all over of a sooty blackness, without a particle of white being visible, I am inclined to consider them of this species.

Long-tailed Duck (*Harelda glacialis*).—This very beautiful bird may be set down as a regular winter visitant to the Bay of Killala: it arrives in October and November, and occasionally delays its departure in spring as late as the first or second week in May. As they seldom come inside of the Killala or the Moy Bar, but keep in the open bay, they are not easily observed, and particularly as they often feed just outside and partly in the surf that is continually rolling on the bay side of Bartra; however, although, when unseen, their peculiar cry will always direct the attention of the observer towards them, for, when once heard, it can never after be mistaken for that of any other bird. I have observed them every winter or spring from 1851 to 1856, both included, except the winter of 1853, during which they did not appear on the river, and I had not the opportunity of searching their haunts in the bay. I shot a young male on the river on the 25th of April, 1855; it is now in the collection of my esteemed friend, Dr. Harvey of Cork. Is it not curious that the greater part of the flocks seen here consist apparently of old males? A flock containing upwards of fifty individuals, seen on the 31st of October, 1856, showed the same disproportion of the sexes; fully three-fourths appeared to be old males.

Golden-Eye (*Clangula vulgaris*).—Is seldom seen on the river before February or March, when a few small flocks frequent the river near Belleek, about a mile from the town of Ballina; they are not usually seen farther down the river, unless when disturbed by the shipping or boats.

Red-breasted Merganser (*Mergus serrator*).—This species is very numerous during winter and spring on the bay and river; they were more numerous than usual this season; on the 31st of last October, at the north of Bartra, I saw a flock of upwards of 500 birds; during winter they stay more in the bay than the river, but in spring they resort in large numbers to the latter. In summer very few are seen, but not one to fifty in winter; I have seen them on Lough Conn in July, and was informed that a few breed on some unfrequented islands there.

Eared Grebe (*Podiceps auritus*).—This rare bird has been occasionally seen on the river. On the 6th of February, 1852, I observed a pair of small grebes swimming in the small channel between Bartra and Moyne Abbey; on shooting one, it proved to be of this species; and in winter plumage showing very little colour on the ear-tufts. On another occasion, in the winter of 1855, I observed for a long time a small grebe, and, from the peculiar shape of its head and *bill*, I have no doubt but that it was the *P. auritus*; it allowed of very close observation, as I brought my boat within six or eight yards of where it was fishing.

Little Grebe (*Podiceps minor*).—Is seldom seen on the river unless when driven by frost from the inland waters.

Great Northern Diver (*Colymbus glacialis*).—This fine bird is a regular winter visitant to the bay and river, but as it is of a quieter disposition than the other Divers, it is not so often seen away from its usual fishing haunts, and on that account it appears less common than it really is. They occasionally remain until late in May before taking their departure for their summer haunts, and sometimes assume their summer garb before leaving. On the 24th of May, 1851, in the open bay near Kilcummin Head, I saw a flock of ten birds, nine of which appeared in full summer plumage; they looked very beautiful, and although I pursued them in a boat for some time, I was unable to shoot any, or even to get within shooting distance, owing to their immense swimming powers when under water.

Red-throated Diver (*Colymbus septentrionalis*).—This handsome Diver is also a regular visiter to the bay and river; it is of a much more restless nature than the Great Northern, and as it is oftener seen on the wing, it comes more frequently under the notice of the observer than the above-mentioned bird. They are also more easily driven to take flight when pursued by a boat than the Great Northern. The Red-throated Diver generally leaves for its summer haunts about the latter end of April, though a few sometimes remain until the beginning of May; some always assume their summer dress before departing for the north. I shot one in the adult plumage in May, 1851.

Black-throated Diver (*Colymbus Arcticus*).—One in the adult summer plumage was seen near Bartra by my brother, Mr. E. H. Warren, in April, 1851; he observed it for a long time with a glass, from a distance of 100 yards.

Common Guillemot (*Uria troile*).—Is seldom seen on the river, as its breeding haunts are several miles west of the Bay. Some have been occasionally washed ashore dead, after a gale of wind on the bay side of Bartra.

Black Guillemot (*Uria grylle*).—Is seldom seen on the river; I have seen them in the Killala channel in summer.

Razorbill (*Alca torda*).—The foregoing remarks may be also applied to this bird.

Puffin (*Mormon fratercula*).—I shot a young bird as it was resting on the shore, near Reserk Abbey, at the Mayo side of the river.

Great Cormorant (*Carbo cormoranus*).—Of the two species of cormorant, this is the most numerous. They fish very far up the river, and even extend their fishing excursions to Lough Conn, where I have seen them in summer. The seasonal moult commences in this species very early: I have seen them exhibiting the white thigh marks the first week in January.

Green Cormorant (*Phalacrocorax graculus*).—Is very numerous. They appear to me to be strictly marine in their habits, for I have never seen an individual in fresh water, or fishing any distance up the river; and, although the tidal part of the river extends about four miles from the bay, they do not fish more than half that distance. A few pairs build on Kilcummin Head, the western boundary of the bay.

Gannet (*Sula bassana*).—Is to be seen every summer fishing in the bay; they keep very far out, almost outside the limits of the bay. I have never observed them fishing near the shore. On the 30th of September, 1851, I caught a young one, in its first year's plumage. It was resting on the Bartra sands, and so exhausted as to be quite unable to fly. It lived in captivity about a week. On being fed, and, after satisfying its hunger, it had a very singular habit of concealing the remainder of its food under its scapular feathers and wing-coverts, and frequently, when it attempted to hide fish entrails, the long ends hanging about its neck and shoulders gave it a most grotesque appearance.

Sandwich Tern (*Sterna cantiaca*).—This is a very beautiful bird; frequenting the bay and river in considerable numbers during spring and summer. I have not been able to ascertain where their breeding station is situated, though it cannot be very far distant from Ballina, for during the breeding season they may be seen daily flying inland in that direction, bearing sand-eels in their bills to their mates and young. They differ so much from the other terns as to the time of their spring migration or return, that I was induced to note the dates of their arrival since 1851. They are as follows:—April 5, 1851; March 23, 1852; April 15, 1853; March 21, 1854; April 1, 1855; and March 20, 1856. Their arrival in the river is quickly announced by their peculiarly loud screams, which can be instantly recognised by the observer who has once heard them. On fine, bright days they have a curious habit of mounting to an immense height in the air, frequently out of sight, and all the while screaming incessantly.

Common Tern (*Sterna hirundo*).—This bird does not arrive in the river before May. I have seldom seen them in any numbers until about the middle of that month.

Arctic Tern (*Sterna Arctica*).—Is also late in its summer return. This bird, or the common one, breeds on some of the small islets of Lough Conn. I have not been able to determine the species with certainty, as I have never shot any on the lake; though, from the great length of the tail feathers and the darkness of their under plumage, I am inclined to think them of the Arctic species.

Little Tern (*Sterna minuta*).—This elegant little tern is very rare on this part of the coast. I have seen it only on three occasions; once near Kilcummin Head, when three appeared in company, and again near Bartra and Scurmore. I shot a specimen on the 24th of May, 1851.

Black-headed Gull (*Larus ridibundus*).—Is very numerous throughout the year; they breed in considerable numbers on the islands of various small lakes in the county of Mayo. On the 21st of May, 1851, I visited a small bog lake, situated midway between Killala and Ballina, and found these gulls breeding in great numbers on a little island in the centre of the lake. On landing on it, it was with the greatest difficulty we could avoid trampling on the nests with eggs, so thickly were they placed all over the island. I counted upwards of 200 nests, all containing eggs; but not a young bird was to be seen hatched on the island. The eggs of the different nests varied considerably in colour and mark-

ings, the ground-colour of some being exceedingly dark, while others were quite light.

Kittiwake Gull (*Larus tridactylus*).—Is very abundant in the bay during the summer; they build in great numbers on the rocky cliffs of Downpatrick Head, seven or eight miles west of Killala.

Common Gull (*Larus canus*).—Is to be seen in considerable numbers, and particularly so in winter. The greater part appear in the adult plumage. I know of but one breeding station in this part of the country, and that is at Lough Talt, a small lake in the Ox Mountains, situated about twelve miles from the sea. Four or five pair bred there in 1855, and, as the proprietor has them strictly protected from molestation, it is to be hoped that they will increase in numbers each succeeding year.

Herring Gull (*Larus argentatus*).—Is common and numerous throughout the year; they breed in considerable numbers on the precipitous cliffs of Downpatrick Head.

Lesser Black-backed Gull (*Larus fuscus*).—This bird is not common on this part of the coast. I have seen but few individuals of the species, and only single birds.

Great Black-backed Gull (*Larus marinus*).—Is very common throughout the year. They have a breeding station at Downpatrick Head. Twelve or fourteen pairs rear their young on the flat, grassy summit of the pillar-like rock near the Head. This gull is much more plentiful here than I have ever observed them on the south coast, in the vicinity of Cork Harbour.

Iceland Gull (*Larus islandicus*).—Is sometimes seen. On the 4th of December, 1851, I shot an immature specimen, as it was flying with some herring gulls over the sands at the north side of Bartra. I also saw another, near Bartra, on the 9th of December, 1854, and a third near Moyview, on the 7th of May, 1855. It flew within eighteen or twenty yards of where I was sitting, and, from the whiteness of its plumage, I should say that it was adult. Immature birds, when seen on the wing, appear of a light-cream colour, and they fly more buoyantly than any of our other large gulls.

Richardson's Skua (*Lestris Richardsonii*).—Skuas are sometimes seen in very large numbers in the month of October, on their passage to the south-west. They were observed by my brother, Mr. Edward H. Warren, to take the same course every October, from 1851 to 1855, during which years he resided at Bartra, and, as they always crossed the island when coming from the sea, he had excellent opportunities for observing the direction of their flight. Some years they appear in greater numbers than in others; but we never remarked them to be so numerous as in October, 1851. We first observed them on the 8th of that month, when two flocks, of six and eight birds, were seen flying towards the south-west; again, on the 15th, we counted seventy-two, as they came from the open sea, in small, detached flocks, and at irregular intervals, but all held steadily on the same course, right across the country. On the following morning they appeared more numerous, and I counted over 100 in a very short space of time. As I was only able to

observe them for about two hours each day, it is very probable that large numbers passed unseen. Occasionally one would alight on the water, as if fatigued, and, after resting for a minute or so, would resume its flight after its distant comrades.

It is singular, that although there were hundreds of gulls on the sands and river while the skuas were passing, they never chased any, or, at least, none attempting to do so came under my observation. We saw a good many adults, with long tails, some having light-coloured throats, and others the belly also; but fully three-fourths of the birds in each flock were immature, short-tailed, dark-coloured birds. I shot one of the latter, as a small flock flew over me on the 15th; but as I felt some doubt as to the species, on account of the resemblance between the young of the Richardsonii and Longicaudatus, I forwarded the specimen to Belfast, to get the opinion of my much esteemed and deeply regretted friend, the late William Thompson, as to which of the two species it belonged; and, in reply to my inquiry, he said that the bird in question was undoubtedly the young of the *Lestris Richardsonii*.

On the 29th of September, 1855, I shot a young bird in its first year's plumage. It frequented the river for nearly six weeks before, and was a perfect torment to the sandwich terns in its vicinity.

The foregoing is all the information I can give regarding the appearance of the skuas in such numbers; but whether it was a regular migration, or only a change of feeding-ground from one part of the coast to another, I must leave to some one more experienced on the subject of migration to determine.

Fulmar Petrel (*Procellaria glacialis*).—An immature bird was found dead on the Moyview strand, on the 24th of January, 1857; it was quite fresh, and apparently died only six or eight hours before being found. It was probably driven from the north by the very severe gale that was blowing from the north-north-west for the two days and nights preceding.

Stormy Petrel (*Thalassidroma pelagicas*).—Is very rare on the river; I once saw one near the quay of Ballina.

After which the members proceeded to ballot, when the Rev. James Mease was elected a Corresponding Member, and W. D. Babington and J. Ellis, *sch.*, Ordinary Members.

DUBLIN NATURAL HISTORY SOCIETY.

FRIDAY, DECEMBER 12, 1856.

His Grace the Archbishop of Dublin, V. P., in the Chair.

The Minutes of the previous Meeting were read and signed.

His Grace the Archbishop of Dublin read a paper on—

THE SONG OF THE BUTCHER-BIRD.

It is not my intention to-night to enter into the natural history of the entire family of butcher-birds, or shrikes (Laniadæ). I merely wish to bring under the notice of the members of the Society a few notes which were made during the month of July last, at Cheltenham, with regard to the song properly so-called of the lesser, or, more properly speaking, the red-backed shrike, or butcher-bird (*Lanius collurio*); and, although I know that it is a rule of this Society that the communications read before it shall be confined to Irish natural history, yet, as a congener of this bird (*Lanius excubitor*) has occurred already, on one occasion at least, in Ireland, I hope I may be allowed to infringe on this rule a little.

Although many authors mention the imitative faculties of the butcher-birds, in respect to the cries of other birds, yet they all say that this faculty is limited to the imitation of the cries and calls only. The only naturalist who at all notices any other power of imitation is Temminck, who, in his "History of Birds," enters fully into the subject. It is rather strange so remarkable a habit should have escaped notice.

The following were the notes which I made on the subject:—Last July, when riding along one of the roads near Cheltenham, I was surprised by hearing, as I thought, a blackcap (*Curruca atricapilla*) singing in a thicket, and, struck with the strangeness of the circumstance, at that season, when all birds are supposed to be mute, I cautiously approached the bird to make sure of its species: much to my astonishment I found that the musician was the lesser shrike (*L. collurio*). On listening awhile, to my still greater astonishment, I heard this bird, dropping the song of the blackcap, take up a most perfect imitation of the song of the sedge-warbler (*Curruca phragmites*); then, successively, the songs of the thrush (*Turdus musicus*), skylark (*Alauda arvensis*), and whitethroat (*Curruca cinerea*), winding all up with the call-note of the partridge (*Perdix cinerea*).

Nor was this the only occasion on which I was able to note this curious trait in the bird's habits. On may subsequent occasions I witnessed similar concerts, in every case being able to identify the bird, thanks to its fearlessness, and thus verify my observation. The mere fact of this bird's imitating the songs of its more favoured brothers of the

grove is a remarkable point in its history, as well as the singularity of the season chosen for the display of this faculty—to wit, a time when all other birds have ceased their song. This songster may well deserve the name of English mocking-bird, and it appears strange that so interesting a habit should have escaped the observation of our English ornithologists, or else have been deemed too unimportant for notice.

After some discussion, Dr. Charles Farran read a paper—

ON THE OCCURRENCE OF THE MARBLED SWIMMING-CRAB (PORTUNUS MARMOREUS), AT BIRTERBIE BAY, CONNEMARA.

In bringing this beautiful species, the marbled swimming-crab (*Portunus marmoreus*), under the consideration of the Society, I was nearly placing myself in a very unenviable position—namely, that of appropriating to myself the credit of adding the species to the Fauna of Ireland—this position resembling in every respect that of the jackdaw (as we are told in ancient writing), who found himself, when the rightful owners of the plumage with which he decked himself claimed their respective properties, left naked and despised.

Most fortunately, a reference to the printed reports of the Proceedings of the Society for the years 1844 and 1845 saved me from this galling infliction, which would have been doubly painful to me, since it fell to my lot to read a paper by the late Mr. William M'Calla, before the Society, in January, 1845. By reading that portion of the report which refers to Mr. M'Calla's discoveries, the Society will be put in possession of the fact that his was the undoubted credit of being the first to place *Portunus marmoreus* on the list of Irish Crustacea.

The following is the extract:—"In the month of January, 1845, Dr. Farran read a paper—Observations on the Productions of Roundstone and Birterbie Bays, Connemara, chiefly the Crustacea, Sponges, and Zoophytes, by Mr. W. M'Calla, being a continuation of Dr. Farran's paper on the rare shells of that district. In that paper a well-arranged list was given of Irish Brachyura, detailing twenty-seven species, and one undetermined species and genus [*Thia polita*]. By this list Mr. M'Calla has added a species to the Fauna of Ireland—*Portunus marmoreus*—and another not referable to any hitherto known genus of British Crustacea. The additions to those already recorded make the Irish Brachyura to amount to thirty-three species. Among the other sections of the Crustacea he alluded to the occurrence of *Nisœa bidentata*, particularly in the button-like front of *Himanthalia lorea*, and also to that of the very interesting species, *Nebalia herbstii*, found under stones and lumps of turf at the head of the bays." I have given the extract in full, so far as relates to the two bays, as it gives some slight insight into Mr. M'Calla's laborious investigations, which he conducted with great skill and tact. I now return to the discovery of *Portunus marmoreus*, the merit of which discovery has not been duly estimated. There is no difficulty in determining the species when brought under view, such as I now exhibit;

but when it is stated that a strand-worn carapace, in which the beauteous markings which characterize the species were almost obliterated—when the species was not even suspected to exist, and when I am perfectly satisfied that M'Calla never saw the crab, not a specimen being in any Irish collection—under these circumstances, his detecting the species, with such meagre materials to assist him, demonstrates his great discriminating powers. The carapace is placed in the Museum of the Royal Dublin Society, where it can be seen.

It may be held in remembrance that I read a paper before the Society early in the session of 1854, giving an account of a dredging excursion I made in that year to Roundstone and Birterbie Bays. I detailed the reasons which induced me to take the course which led to the discovery of the locality where the magnificent specimens of *Pectunculus glycimeris* were obtained so abundantly. With those were associated *Portunus marmoreus*, rivalling the Pectunculus in those exquisite markings which so characterize that species, and excelling it by the graceful evolutions and attitudes it assumed both in the water and on the deck of our vessel. A more interesting object could not be witnessed. It was obtained rather plentifully; four or five specimens were captured in each haul of the dredge, and as I was highly favoured that year by fine weather, these were rather frequent; and I should say that I obtained above one hundred in the course of the day. It is not necessary to allude to the reason why I did not preserve some specimens; probably I was so occupied with the Pectunculi, and other rarities that came under my notice, that I passed them over. I was aware of the great difficulty in preserving the colours of the shell, so as to render them worthy of a a place in a museum, and this also tended to make me indifferent to them.

On my return to town I mentioned to several naturalists the fact of my having obtained this hitherto rare crustacean; and, although I cannot say that I was actually doubted by any, still there can be no hesitation in saying that the production of some specimens would have strengthened their faith exceedingly. I proceeded to Roundstone last July, in order to obtain the Portunus, and to ascertain whence M'Alla procured the carapace. Never was there a better exemplification or fulfilment of the old adage—

> "He who would not when he may,
> When he would, he shall have nay."

The very first day I went out we were overtaken by a gale, indeed, the men called it a hurricane, which compelled us to put into the first shelter we could reach. The next day was a dead calm, and so on for a fortnight alternate storm and calm. One day, for an hour or two, I was fortunate in having a favourable breeze, when I reached the Pectunculus ground. During that time I obtained three specimens, and it was significantly observed by one of the men, that it required the boat to be under good way to catch the crabs, as it was only then they were

brought up in the dredge; for when the speed was slackened, we got Pectunculus, but no crabs; and this I suppose was the literal fact. The depth of water was about twenty-two fathom, and the bottom a hard yellow sand.

When I asked the men whether M'Calla had ever dredged there, they said he never had; and when I inquired where he could have obtained the carapace, they at once replied at Gurteen strand, about two miles from the spot, that being the only spot where *débris* was thrown up. They also mentioned that the dredge he had was small, and would not sink here, as the current was so strong, and this I found to be the case. It is in vain to go with the current or against it—in the first case the net is reversed and goes before the dredge; in the latter case the dredge floats, and, should it reach the bottom, it hops, and never lies permanently on the ground; the current must be crossed, and this requires a good vessel, a heavy dredge, and good men to work it, and these M'Calla never had, owing to the rather heavy expenses attending them, so that, from this account, it would appear that the animal lived and died on this bank, and was carried by the current and thrown on Gurteen Strand, and there found in its mutilated state by M'Calla, who had thence determined the species. I have now given an account of the capture of the crab, and its locality. It appears to me that a current is its domicile—it is never found in the sluggish waters of either bays, where *Portunus corrugatus* is found abundantly. It is a very active crab, and it behoves it to be so, as the current which carries its prey runs at the rate of seven or eight miles an hour. We have seen that it has activity enough to avoid the dredge when the vessel was not under very rapid way.

I alluded to the difficulty of preserving the colours of the Crustacea. I am happy to say that that is now removed, and henceforth this class of animals will grace our museums in all their varied and beautiful colours. I am indebted to Colonel Wegg for being in a position to show the result of his scientific applications. Immediately on getting those specimens, I packed them up in a small box, filling up the remaining space with fresh chopped sea-weed (*Fucus vesiculosus*), and forwarded them to him by mail. His success was far beyond my most sanguine expectation. The specimens are in appearance this moment as fresh as when taken, nearly six months since.

Before I close, I may be permitted, in the words of Bell, to say—"that the portion of the crab denominated the carapace is the outer shell or the large enveloping buckler which covers the entire of the thorax; and even the abdomen itself is folded underneath it, so that the whole animal is hidden by it. This remarkable buckler, covering as it does the whole of the viscera, is found to be more or less divided distinctly into regions, which are indicated by elevations separated from each other by grooves, and to these regions have been given names derived from the different organs which are immediately covered by them."

In the species *Portunus marmoreus* the abdomen in the male is five-jointed; in the female, seven-jointed.

Mr. Andrews said that the thanks of the Society were due to Dr. Farran for his perseverance in following out the important discovery of the late William M'Calla, and for the very beautiful series of *Portunus marmoreus* he had brought before the meeting. Mr. Andrews was not at all surprised at Dr. Farran's meeting with that beautiful crustacean in such abundance on the west coast; it was only confirmatory of the identity of many other marine animals of that coast with those of the shores of Spain and the Mediterranean. But a very superficial research had as yet been made among the Crustacea of the coasts of Ireland, especially those of the west coast, where by far the greater proportion of species of British marine animals were doubtless to be met. This dearth of information was chiefly owing to the few trials of the dredge in deep water; for the rarer animals might be taken there, and, even at the depths of eighty fathom, some of the most delicate crustaceans would be found.

In eighty-four fathoms, off the Tiraght Rock, in fine gravelly soundings, *Pandalus annulicornis* and *Palæmon serratus* had been taken; they were particularly abundant in the stomachs of the cod-fish; species of Hippolyte and of Mysis, *Pirimela denticulata* and *Hyas coarctatus*, were also taken. In Dingle Bay, in twenty-five fathoms, on the trawling ground, on fine sand, *Corystes cassivelaunus* and *Maia squinado* are constantly taken up with the trawls. Mr. Andrews begged to present to the Society some specimens of *Portunus puber* and *Portunus holsatus*, taken in Dingle Bay. A specimen of the latter so closely approached in distinctive characters *P. marmoreus* as scarcely to be distinguishable from it. Associations ought to be formed for exploring more effectively the marine productions of the west coast, as off the bays of Galway, Dingle, Ballinskelligs, and Kenmare, in soundings of from forty to sixty fathoms, good dredging ground would be met on fine gravelly bottoms, fine sand, and soft sand and mud. It was in eighty-one fathoms he had taken the living specimens of *Eunice tubicola*.

Dr. Kinahan stated that the addition of this species to the Irish list was not the least interesting among the many additions made by the late M'Calla. It was most gratifying to have M'Calla's locality for this interesting species placed thus completely above suspicion, and Dr. Farran doubtless deserved a great deal of credit for his perseverance in endeavouring, in spite of unfavourable circumstances which he had detailed, to prove this point.

From a careful examination of Dr. Farran's beautiful series of specimens, he felt no hesitation in venturing to dissent altogether from both Bell and Milne Edwardes as to the specific identity of *P. marmoreus* and *P. holsatus;* no one who examined these beautiful specimens could for one moment imagine that the species were identical. The distribution of the species was distinct too, for *P. holsatus* was much more generally diffused and more northerly in its distribution than *P. marmoreus*, which as yet had been only found in the southern parts of Britain.

After some further discussion, Dr. J. R. Kinahan read a paper—

ON XANTHO RIVULOSA AND OTHER DECAPODOUS CRUSTACEA OCCURRING AT VALENTIA ISLAND, CO. KERRY.

In recording this, the second notice of the occurrence of *Xantho rivulosa* on the Irish shores, I mean to take the same opportunity to submit to your Society such notes with regard to some of the more remarkable Crustacea which occur at Valentia Island, as a hurried visit to that locality last summer, under unfavourable circumstances, afforded me, combining with them remarks on the distribution of the species around Ireland generally, as far as the scanty materials at my command will enable me to do. These, though imperfect, I am led to lay before you, chiefly by the great lack of information on this subject which I find pervades all our Natural Histories, even those very lately published.

It is a matter much to be deplored, that naturalists generally do not oftener avail themselves of opportunities of compiling comparative tables of the productions of the various districts they may examine; but, instead thereof, sinking the naturalist in the mere collector, rush rather after a multitude of specimens or species than a limited number of general facts. I do not wish to undervalue the collector's labours, but rather to prompt every collector to become a naturalist also, and by carefully noting the special peculiarities of each district which he examines, to enable himself and others thereby to arrive not only at particular conclusions as regards that locality, but also at general ones as regards the Fauna of the entire country, and its bearings on the Fauna of the whole world. That the importance of this matter is not overrated must be apparent to any one who takes the trouble to examine even the best arranged books of modern days, with regard to the distribution of our marine animals, and (with, perhaps, the exception of the Molluscs) the deficiency of authentic information will be apparent on even a superficial examination, this deficiency in a great measure arising from observers having sought and noted the rarest, or what they considered the rarest species, only.

The principal data on which the following remarks as to distribution are founded are as follow :—For the north of Ireland generally, the specimens in what is commonly known as the Ordnance Survey collection, or Down Survey collection,—a collection made by the officers of the Ordnance Survey of Ireland, under the direction of Captain, now Colonel Portlock, during the years 1839, &c., in the counties of Donegal, Antrim, Down, and Londonderry, and which is at present in the Museum of Irish Industry. Where this is referred to, the letters O. C. are placed after the locality.

For the east coast, my own experience of Dublin Bay, assisted, in a very few instances, by the collections of Dr. Ball and other kind friends.

For the south, my own experience in Youghal and Ardmore, and also J. V. Thompson's collection of Crustacea, now in the Royal Dublin Society's Museum; and also the Catalogue prepared by the Cork Cu-

vierian Society in 1849. These two latter are referred to as J. V. T. and C. C. S. My own notes are, in every case, unmarked, the locality being given without any initial.

For the west, in addition to my own notes made at Valentia Island, in 1856, and at Kilkee, Galway, &c., in 1852, I have also made use of a catalogue, supplied me some years since through the kindness of Dr. Farran, of the principal species captured by W. M'Calla in Birterbie and Roundstone Bays, marked by the initials W. M'C.

Correcting and adding to all these various sources from Bell's British Crustacea, and William Thompson's Notes on the subject, as given posthumously to the world in the fourth volume of the "Natural History of Ireland." This last has been noticed as W. T.

The list by no means purports to be a complete distributional one; a task so comprehensive must be left for the future; but is merely intended to notice such species as either came directly under my own observation while living, or of which specimens, concerning whose authenticity there could be no doubt, were seen by me.

So much has lately, that is to say, within the last few years, been said and printed concerning the superior capabilities of the west of Ireland as a field for research, that naturalists have been insensibly led to look on it as the El Dorado of Irish Natural History, where "monster nuggets," in the shape of new species, and rare animals and plants, are tossed up by every tide and breeze; the usual answer of the old hands and authorities to the anxious inquirer seeking information regarding the *locale* of some rare species "Common in the west," helping to foster this opinion, so that every naturalist could not but feel impatient for an opportunity to examine into and revel amidst such treasures. Any one who has felt the pleasure of breaking ground in a comparatively new and seemingly rich field can quite appreciate the feelings with which I gladly accepted an invitation to spend a few weeks at Valentia Island, which, embayed as it is in an inlet of the Co. Kerry, ought to furnish the carcinologist with every species which frequents the coast.

Among the many species marked as Irish, on the authority of the occurrence of a single specimen, none, with, perhaps, the exception of *Polybius Henslowii*, possess more interest than the subject of this notice, *Xantho rivulosa*, one of the types of a genus which, essentially subtropical, reaches its northern limit on the British shores, itself an undoubted member of that Fauna whose scattered members, in characters not to be mistaken, attest the probability, nay, almost the certainty, of the truth of one of the most brilliant theories ever propounded,—that of the lamented Edward Forbes,—surmising the union and intermingling, at some period of the world's history, of the Fauna of the west of Ireland and Mediterranean districts; add to this the fact of its having been detected hitherto in Ireland only at the extreme north, and that, when then discovered, now fifteen years back, a second specimen was sought in vain; that during this long interval it has remained undetected, escaping the careful research of even W. M'Calla (at least, it neither appears among his lists, nor can I find specimens of it in the

many collections supplied by him), and, therefore, evidently either very rare or very local.

Taking these latter facts into consideration, it appeared to me, when starting for Valentia Island, with the determination of seeking this species, that it was rather a wild-goose chase, and the chances of success but small; and my experience at Valentia Island would lead me to believe that either the species is everywhere scarce, or else, what is just as probable, that it, in its habits, differs much from those of *Xantho florida*, and that its scarcity in collections depends on the blundering of the collectors. Although I assiduously sought for it, but one specimen rewarded my labours,—that now before you,—sufficient, however, to prove the existence of the species on the coast, and to stimulate a further search at some future time.

The general aspect of the shores of Valentia Island needs little description: every form of beach, slob, shingle, sand, and rocks, and rock pools occur, and a rapid and strong current sets in round the island, so that there is no lack of fitting localities for every kind of Crustacea. My researches were confined to the littoral zones chiefly, and hence this list includes but few of the Macroura and Anomoura.

LIST OF SPECIES.

Hyas araneus, common, and a littoral species here. In Ireland it has occurred all round the coast, as follows:—Carrickfergus (W. T.), Dublin, Youghal, Valentia, Clew Bay (W. T.).

Hyas coarctatus, apparently rare. I saw but one specimen. This may arise, however, from its being a frequenter of deeper water than the last; such, at least, I find to be its habits in Dublin. This species has been selected by Dana as a type of his Caledonian group, and yet it is recorded as occurring on the shores of La Manches. In Ireland it has occurred at Giant's Causeway (O. C.), Belfast (W. T.), Dublin, Cork (J. V. T.), Valentia Island, Galway Bay, 1857. In Dublin Bay it is much commoner than the last, being less local, but preferring deeper water.

Maia squinado, common, and deep sea, or, at least, laminarian; taken in the lobster-pots; undoubtedly a southern species. Forbes makes it one of his South British types. Information with regard to the limits of its distribution is much wanted. It is recorded from Wexford (W. T.), Cork (J. V. T.), and the west coast, as far north as Roundstone Bay (W. M'C.).

Xantho florida, very common under stones between tide-marks. Two distinctly marked varieties occur, the one having the wrists quite smooth, the other with the wrists picked out into irregular, confluent, slightly raised ridges. This is probably only a variety of the smooth-wristed form, as intermediate forms are common. There is great variety in colour among the specimens, some being colourless, similar to the specimen recorded in Thompson from Lahinch, and which, through the kindness of Dr. Robert Ball, I have had an opportunity of examining.

The species appears to be southern and western in its distribution.

It has been recorded in the Dublin lists on the authority of Dr. Ball. I find the observations of this gentleman with regard to our Dublin species so correct,—in fact, in every instance but this having verified his observations by specimens obtained by myself,—that, although a careful search for this species in Dublin, on my own part, has been hitherto unsuccessful, I yet feel great hesitation in contradicting the statement. The fact of there being but a single specimen in his collection, so marked, leaves room, however, for the surmise that there may have been some mistake. In Ireland it has been recorded in Antrim (O. C.), Dublin Bay? (R. B.), *vide ante*, Hook Head (R. B.), Cork? (C. C. S.), Valentia Island, Tory Island (W. T.) The specimen thus marked in J. V. Thompson's collection is *X. tuberculata*.*

The fact of the species having occurred on the north-east coast does not militate against its being regarded as southern. Several other seemingly southern, or, more probably, western species, are found to occur along the eastern coast of the north of Ireland. In England, as far as I find it recorded, the distribution of this species is southern.

Xantho rivulosa.—Along with the last, a single specimen was found under the stones near Renaune Point: it is a female, and half grown, and exhibited the following distinctive characters, as contrasted with *Xantho florida*, captured at the same place:—Front produced, directed forwards, lamellar, *beaded along its margin;* pterygostomian regions *granulated* (in *X. florida*, punctated); dentition of lateral edge. D. slightly marked, yet distinct, E. N. T. S.; (in *X. florida* D. nearly completely obsolete); superior surface of carapace much flattened, posterior pairs of legs *hairy upon superior edges*. The character of the double groove on the movable finger is by no means a constant distinction, as it is found in some young specimens of *X. florida*.

This is undoubtedly a southern species. The only Irish specimen heretofore known, and which I am, through the kindness of G. V. Du Noyer, Esq., enabled to figure from the original sketch made in 1839, and which is itself here exhibited through the kindness of the authorities of the Museum of Irish Industry, was obtained at Portrush, 1839 (O. C.), Hook Head (R. B.),† Valentia Island, 1856, Galway (Prof. Melville).

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* *Xantho tuberculata*.—Among the collection of Crustacea purchased from J. V. Thompson by the Royal College of Surgeons, Ireland, and by them presented to the Royal Dublin Society, there is a mutilated specimen—marked in the Catalogue No. 23, "I. *Xantho floridus*, imperfect"—which is either this or some closely allied species. The absence of the hindlegs prevent a positive opinion as to the species; but in the produced front and coarsely tuberculated hands, &c., it appears identical with Bell's figure. I have noticed it here, as it appears to have escaped W. Thompson's observation; and it were exceedingly desirable if the occurrence of this south British type on the Irish shores could be confirmed. It is singular that there is no specimen of *Xantho florida* at all in the collection. I have been at pains to identify this specimen as the actual specimen described in the Catalogue as above, and find there cannot be any doubt as to its identity.

† *X. rivulosa*.—Since the above paper was read, Dr. Robert Ball kindly afforded me an opportunity of examining the fine collection of Irish Xanthos in the University Museum, Trinity College, and among a number collected at Hook Head, county

Cancer pagurus.—Here, as all round Ireland, occurs abundantly, and appears to be universal—in fact, no district is without it.

Carcinus mænas.—Also abundant, varying much in colour, especially the young specimens which at Valentia Island are generally of dark olives and grays. I did not meet any of the light-coloured varieties which are common in the Dublin rock-pools. The amount of arcuation of the front varies much in some of my specimens. This species appears as widely distributed as the last.

Portunus puber.—Very abundant, littoral and laminarian. The Valentia specimens are much more convex than Dublin coast specimens, which are, many of them, nearly quite flat. The young of this species, as well as those of the next two, might be easily confounded with those of *Carcinus mænas*, the only difference at first sight being a *sparse pubescence*. The young specimens of this species are, many of them, most beautiful in their colours: patches of rose-pink adorning the branchial region, and a stripe of the same colour running down the median line. The frontal teeth in young specimens appear as pearly granulations only.

Distribution.—Bangor, Co. Down (O. C.), Dublin, Youghal, Valentia, Lahinch, Tory Island (W. T).

Portunus corrugatus.—Rare; small specimens occur in pools left in the sands and among *Zostera marina* at Ringlass Point. It appears to be generally distributed around Ireland, though there is no certain record of its having been found on the south coast. It is omitted in the Cork Cuvierian Society's list. J. V. Thompson's specimens, marked *P. corrugatus*, are uncorrectly named; as it occurs in the Mediterranean it may be a southern species, attaining its extreme limit in Dublin Bay, but, more probably, further research will establish it around Ireland. At present, the following comprises the districts in which it has been found:—Larne (O. C.), Dublin Bay (R. B.), and also my own collecting, Valentia Island, and the west coast generally, to Birterbie Bay (W. M'C.).

*Portunus arcuatus.**—Specimens occurred in the same locality as the last; this species is a most interesting example of representative form, copying closely the outline of *Portunus integrifrons* of the Indian

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of Wexford, by Doran, some years since, I had the pleasure of detecting a small specimen of this species—thus confirming its southern range. Although this collection includes some dozen specimens, which I carefully examined, I could not find another example of this species. These specimens, Dr. Ball informed me at the time, had never been critically examined before.

* *Portunus carcinoides* (Mihi).—Along with the above species three specimens of a Portunus occurred, which, though neighbouring to *P. corrugatus*, seem to belong to some other species. I have, therefore, ventured to describe it provisionally, under the name of *P. carcinoides* (from its resemblance to *Carcinus mænas*), as follows:—

Carapace smooth, without raised ridges, regions marked out by rounded prominences only, sparsely hirsute. Front *three-lobed*, middle lobe largest, *edges of lobes entire*. Antero-lateral margin of carapace five-toothed. First pair of legs equal, surface nearly smooth, hirsute; two flattened, triangular teeth at anterior superior angles of wrist; hand with two well-marked carinæ on the upper sides, *the inner terminating*

Ocean, and even the habitat,—which appears to be erroneously given in Bell as deep water,—at least in Valentia Island, I find *P. arcuatus* tolerably abundant under weed-covered stones, between tide-marks, precisely as *Portunus integrifrons* occurred to me in Port Philip Bay, Australia. The young specimens of this species are, probably, often passed over as *Carcinus mœnas*, from which it is often difficult to separate them. It is, most probably, a southern species, that is to say, one of Forbes's Atlantic types.

In Ireland it has been recorded as occurring as follows:—Strangford Lough (O. C.), Portmarnock, Co. Dublin (R. B.), Dublin Bay, 1852, Cork (J. V. T.), Valentia Island, Killeries (W. T.).

Portunus depurator occurs, but not common. This species has been erroneously supposed to be rare in Ireland, probably from its being generally an inhabitant of tolerably deep water: it is neither rare nor yet local, as the following list shows:—

Belfast (O. C.), Portmarnock, Dublin, Bray, Youghal (R. B.), Valentia, Dingle, (W. Andrews, Esq.), Roundstone (W. M'C.), Galway.

Portunus holsatus did not occur to me; specimens of it were shown me, and specimens from Dingle Bay, collected by Wm. Andrews, Esq., are before you. This species is undoubtedly more northerly in its tendency than the preceding; in Dublin Bay (where it is far the commonest species) a wrinkled variety, hardly to be distinguished from *P. depurator*, occurs especially in Dalkey Sound; it frequents sandy bottoms more than that species.

Distribution:—Belfast (W. T.), Dublin, Cork (J. V. T.), Dingle (W. A.), Roundstone (W. M'C.), Galway, 1857.

Portunus pusillus occurs rare; a generally diffused species; but seemingly rarest on the western shores. In Dublin Bay it occurs commonly in the extreme laminarian zones, as at Dalkey Sound, where, nearly in every haul of the dredge, specimens may be captured.

Co. Down (O. C.), Dublin, Cork (J. V. T.), Valentia, Roundstone (W. M'C.), Killeries (W. T.)

The only other Portunus taken in Ireland (*P. marmoreus*) was, as you have been already informed to-night, first captured by W. M'Calla, in Roundstone Bay.* Into its history there is no necessity to go further,

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in a very minute, obtuse tubercle. Upper edges of second, third, and fourth pair of legs very sparsely hirsute; fourth joint broadly keeled above; fifth and sixth acutely keeled; sixth joint slender, styliform; terminal joint of posterior pair of legs narrowly lanceolate, with a raised central line, hairy on the edges.

The specimens obtained were all young. I have, therefore, preferred inserting the species in a note; but it is probable it has been passed over as either *P. arcuatus* or *P. corrugatus*. It might also be easily mistaken for young of *C. mœnas*. It occurred in the rock-pools and also under stones on Ringlass Point.

* The following are M'Calla's own words recording this discovery:—

"PORTUNUS MARMOREUS.

"A short time previous to leaving Connemara, I had the pleasure of finding a single individual of this species. This is the first instance of its occurrence as Irish. Habitat: a sandy beach, at extreme low water; locality, Island of Innislacken."—*Saunders's News-Letter*, Jan. 9, 1845.

as it has already formed the subject of an interesting paper from its rediscoverer there, Dr. Farran. I will just state, that in Britain generally it has been recorded as having been found at Edinburgh, by Dr. Howden, there may be some mistake here, as *P. holsatus* does not occur in his list at all, and it is also included in a list of Moray Firth Crustacea, but *P. holsatus* is also omitted here, and all along the south coast of England; it has not occurred as yet on the south coast of Ireand; but I am sure, if sought, it will be found there too. It is a Mediterranean species, and very distinct from both *P. holsatus* and *P. depurator*. Galway, 1857.

Gonoplax angulatus.—A single specimen was shown me, obtained on the shore, near the quay, living, after a heavy gale. I sought it myself in vain.

This species is a most puzzling one in its distribution, and undoubtedly local where it does occur. It has occurred on the coast of Dublin, as specimens, in the possession of Dr. C. Farran and Dr. R. Ball, prove.

Distribution:—Bangor, Co. Down (O. C.), Dublin (R. B. and C. F.), Cork (J. V. T. and R. B.), Valentia Island, Roundstone (Prof. Melville).

It is possibly a southern species, following that peculiar line of distribution to which I have already alluded; that is to say, south, west, and north of Ireland, and, for a limited distance, down the north-east coast. However, further research may prove it be an inhabitant of the entire eastern coast. It is a Mediterranean species.

Pagurus streblonyx.—General in its distribution round Ireland, occurring north, south, east, and west.

Porcellana platycheles.—Exceedingly common under stones, the specimens varying much in colour.

Distribution:—Carrickfergus (W. T.), Portmarnock, Co. Dublin, Valentia Island, Kilkee, Tory Island (W. T.). A very local species on the eastern coast, thoughjust as large as the northern specimens.

Porcellana longicornis.—Common in the deep rock-pools, among *Corallina officinalis*.

Distribution:—Strangford (O. C.), Dublin, Ardmore, Youghal, Valentia, Lahinch, &c. A very common and very generally distributed species.

Galathea squamifera.—Rare among the deep rock-pools of rather large size; one specimen only obtained; it appears to be generally distributed around Ireland. About Dublin, though small specimens are common in the lobster-pots and the dredge in the laminarian and coralline zones, adult specimens are seldom captured. It has occurred as follows:—Portrush (O. C.), Dublin, Youghal (R. B.), Valentia Island, Birterbie Bay (W. M'C.).

Palinurus vulgaris.—In lobster-pots. This is essentially a western species, but obeys the same law of distribution as *Portunus arcuatus*, *Xantho florida*, &c. It has occurred at Magilligan (O. C.), Youghal (R. B.), Valentia, and west coast generally. I can find no record of its having occurred on the eastern coast. Though fishermen have told me of its occurrence in Dublin Bay, I never succeeded in getting specimens of it.

Homarus vulgaris.—All around the coast. Calls for no particular remark.

Palæmon serratus.—Common on the zostera-covered banks, very large in size. The distribution of this genus is rather confused. A Palæmon under this name has been recorded as follows:—Portrush (O. C.), Dublin?? (W. T.), Youghal (R. B.), Valentia Island, Dingle (W. Andrews), South Isles of Arran (R. B.), Galway.

The fact most worthy of notice suggested by this list is the occurrence of species, undoubtedly southern or western in their tendencies, on the eastern coast. The most remarkable of these are *Xantho florida*, *Portunus corrugatus*, *P. arcuatus;* all common on the west, and either rare or local on the east, at least in Dublin Bay, where I have examined hundreds of localities similar to those in which these species occur plentifully on the west, and have only found one or two specimens. It would appear as though the tide of migration of these species northwards sent off a small stream southwards round the north-east coast of Ireland, which, probably, did not much extend beyond Dublin Bay, as these western species are much more numerous to the north of Howth than to the south of it. They will, probably, south of this point, if occurring at all, be found to be inhabitants of the deeper zones, while, as will be seen by reference to the lists above, on the western coast they occur as littoral species.

In the above list I have purposely abstained from mentioning many of the true western species, inhabitants mostly of the deeper water—such as *Achæus cranchii*, taken by Professor Melville, of Galway College; *Pisa tetraodon*, by M'Calla, at Roundstone; *Thia polita*, by M'Calla, at Roundstone; and also in Galway Bay by Professor Melville, who at the time was ignorant of its previous occurrence on the British coasts, &c.; because this is not by any means intended for a perfect comparative list, but merely as a contribution to such a list. Had I drawn on the experience of others, the number of species could have been much augmented; but, for the reasons stated above, it appeared preferable to record my own observations only. In conclusion, I may observe, that of the most important species mentioned, specimens have been placed by myself and others in your Society's Museum, where they may be seen.

Mr. James R. Dombrain wished to notice the occurrence of the rose ouzel (*Pastor roseus*) at the Ball's-bridge Nursery, in the neighbourhood of this city, in the month of July last. He had much pleasure in presenting the specimen (which was the only one seen) to the collection of the Society. It is a bird of very rare occurrence in this country.

Mr. W. Andrews, Hon. Secretary, read a communication from the Right Hon. John Wynne, of Hazlewood, county of Sligo, recording the interesting discovery of the true maiden-hair (*Adiantum Capillus-Veneris*), in the valley of Glencar, county of Leitrim. This fern (one of extreme rarity in Ireland, records of its occurrence being hitherto confined to Tralee, Isles of Arran, Urrisbeg, and Co. Clare) was growing at a

considerable height, with a south-west exposure, in veins of shale which run through the limestone. It attained considerable luxuriance. This is the most northern locality known for the plant in Ireland.

The meeting then adjourned to the month of January, 1857.

After the ballot, the following were declared duly elected as Ordinary Members :—Arthur Mitchell, M. D.; John Hamilton, Esq.

FRIDAY EVENING, JANUARY 23, 1857.

Rev. Samuel Haughton, F.T.C.D., M.R.I.A., in the Chair.

The Minutes of previous meeting were read and confirmed.

Mr. W. Andrews took the opportunity to correct a mistake which had crept into the report of a paper read by him at the meeting of the Society in June last, on the occurrence of the brown hairstreak (*Thecla betulæ*) in Kerry. By some inadvertence he had been stated to have only observed one specimen, whereas, on the contrary, this insect was just as abundant in that locality as the brimstone butterfly (*Gonepteryx rhamni*). The hairstreak being considered a very rare insect in Ireland, he thought it advisable to correct this error.

Mr. R. P. Williams then read a paper—

ON THE OCCURRENCE OF COLIAS EDUSA IN THE COUNTY OF WATERFORD.

I have the pleasure of bringing before the notice of the Society, this evening, specimens of one of the rarest of Irish butterflies, which I have only seen recorded as such in the recent work of the Rev. F. O. Morris, on "British Butterflies," wherein he states that, on the 9th of September, 1844, two were seen, and one captured, by Mr. Joseph Poole, of Grovetown, near Wexford. A much earlier instance (the precise time of which I cannot supply, but certainly as early as 1820), however, occurred, when Mr. Tardy was forming his collection—afterwards increased by numerous additions, and classified by the late Dr. Thomas Coulter, Mr. Tardy having died ere he completed his task. This collection may now be seen in the Museum of Trinity College. Enthusiastic, however, as Mr. Tardy was, I believe he was not able to secure an Irish specimen, although two or three English, and marked as such, are in the collection.

A co-labourer in the field, the late Mr. Cooper Haffield, was more fortunate. He was, at least, blessed with a sight of the insect, though not doomed to be fortunate in capturing it. He is reported to have chased it for a distance of three miles, when it fairly baffled him by taking out to sea between Wicklow and Arklow Head. On return from his excursion, Mr. Haffield was so excited by the chase, and by the recollection of the insect vividly existing in his imagination, that, to record the fact, he at once set to work, and made a fac-simile of the butterfly he was not destined to capture. This he placed in his cabinet, and it has been passed over many a time by inquisitive eyes without detection, and duly acknowledged an Irish specimen. I had often heard that story very amusingly told, but with some degree of scepticism, until

I read the history of the butterfly, and learned that its haunts are the sea-shore, and its flight so rapid as to render its capture a matter of considerable difficulty. I think it a matter to be regretted that the derivation of names of genera is not generally explained in works of natural history. Not finding Colias explained, I have been guessing at its derivation, and as I find Κολιά signifies a dance, I presume the name of the genus to be derived from that word, expressive of its mode of flight. Colias, I find also, was one of the names of Venus, from a promontory in Attica of that name, whence, possibly, the genus may have been named.

The specimens presented this evening were collected by one of our members, Mr. Richard B. Ussher, a young gentleman from whose zeal in the pursuit of natural history much good may be expected. He has already presented a large number of insects (which I hold in trust for the Society until proper cases shall be provided), besides other donations to the Society. These specimens were obtained in the autumn of 1855, and about the same time several other specimens were obtained by Mr. Samuel W. Tyndall, at Glanmire, county of Cork. This insect, though tolerably plentiful in England in some localities, is not to be counted on as being sure to be found, so much so, that many have considered its appearance triennial, quadriennial, and others septennial.

I shall proceed to read Mr. Ussher's account of the capture of the specimens presented by him. "In the autumn of 1855 I was staying at Ardmore, a place situated in the county of Waterford, between the towns of Dungarvan and Youghal; and being out walking one day round the cliffs, or rather in the fields above the cliffs, I was catching painted ladies (*C. cardui*), red admirals (*V. ammiralis*), and other butterflies, which occurred there in great abundance, when I observed a yellow butterfly which came flying up over the cliff; it flew very fast, and constantly alighted on the yellow flowers of the dandelion, which it closely resembled in colour, so that it could not be easily distinguished amongst them when it was not flying about. As I had never seen such a creature before, I pursued it, and easily captured it when it was feeding on a flower, but I could not catch it on the wing, it was such a strong flier; it proved to be a male of the species mentioned. After this I saw several others in the same locality; I suppose I saw twenty in that season altogether, but I never saw more than two in the same day: they always seemed to prefer dandelion or some other yellow flower. In the end of October I saw a male one day amongst the heath and furze on the side of a hill near Cappagh, about six miles from Dungarvan Bay, which is the nearest sea-coast. I succeeded in catching five of them that year at Ardmore—namely, three males and two females. I did not see any of them in the same locality this summer, as this was an unusually bad year for butterflies. I understand that others caught some near the same place, and at the same time as I did.—R. J. Ussher."

Dr. Kinahan observed that it was most gratifying to find that the country members of the Society were not altogether forgetful of its

meetings, and hoped that this paper was only the forerunner of many more, as interesting, from the same locality.

From his own experience of Ardmore, during 1852 and 1853, he had little doubt that this insect, in common with many others rare elsewhere, was to be met with during most years. When in that neighbourhood, in 1852, in company with a friend, the result of some of whose labours in natural history he himself had had the honour to record in the "Transactions" of the Society, but who was now, alas! no more—Edward Henry Sargint, Esq., he had met this butterfly in a narrow, sandy field, at Whiting Bay, next the sea. Mr. Sargint, who had collected the insect on the Continent, and was a keen lepidopterist, at once pointed it out as a rarity. Three or four specimens were seen on that occasion, but none were obtained, through want of a proper net.

On a subsequent occasion, Mr. Sargint captured several specimens, which Dr. Kinahan afterwards saw. It was to be hoped Mr. Ussher would follow up his investigations into the Lepidoptera, not merely of Ardmore, but also of the lower valley of the Blackwater, where many rare things might be expected to occur.

Mr. Gilbert Sanders had met the insect in Devonshire. His first acquaintance with it was in 1844, on the glacis of Plymouth citadel, and had nearly eventuated in an introduction to a more unpleasant acquaintance—viz., a bayonet; as having, in the ardour of his pursuit, scaled the ditch, he was arrested by the sentry for trespassing on forbidden ground. This spot is facing the Sound, and, of course, near the sea. He had, however, also met the insect in immense numbers at a great distance inland—at Plymvale, at the foot of Dartmoor mountain, on aquatic plants which fringed the "aits" here. They were here in such numbers that he was always sure of capturing them, and often saw a hundred specimens in an hour's walk. The capture in Ireland is curious, as occurring in a district in which the geological features resemble those of the districts in which he had captured it in England. Perhaps this arose from some peculiarity in the plants of the district.

Mr. William Andrews, Honorary Secretary, read a communication from Lord Clermont—

ON THE OCCURRENCE OF THE EARED GREBE.

"It may be interesting to the Society to know that either a female or young male of the eared grebe (*Podiceps auritus*) was shot on my estate at Blackrock, Dundalk, on the coast, on the 13th last December (1856): according to Thompson and Yarrell, it is of rare occurrence in any part of the British Isles. The bird is now in my possession."

Mr. Andrews said this was an interesting addition to many important and valuable communications of the kind already made by Lord Clermont to the Society. Mr. Andrews had also heard of the capture of the eared grebe, twelve months since, at Fethard, county of Wexford. This last notice had not been, however, confirmed.

Mr. James Haughton exhibited some curious webs woven by *Tinea granella* (?) over a quantity of Indian corn, and which, in the abundance of the web, and its greater toughness of texture, differed from that woven by similar, if not the same insect over heaps of wheat. The web exhibited was of two kinds—the one occurred as a comparatively unbroken sheet, of considerable size, of the consistency and thickness of Chinese paper, in colour varying from a whity-brown to nearly pure white, and of extreme toughness, though in parts no thicker than the finest gauze. These specimens, Mr. Haughton stated, were obtained from the side walls of the loft, to which they adhered, depending in long sheets, and giving the walls the appearance of having been papered with a whity-brown tissue paper, with a glistening surface. The ceilings, and other portions of the loft which had been plastered, were covered with a similar web, similarly adherent.

The other specimens were of a dirtier colour, more broken in texture, and covered over with cocoons of the moth. The sheets were mostly double, and were found spread like a cloth over the entire surface of a small loft of corn. The surface of the web was covered by myriads of the larvæ, crossing and recrossing in every direction. These larvæ, in many instances, had attached themselves to the web, and there, spinning their cocoons, entered into the pupa state, the surface-web forming the under side of the cocoon.

The rapidity with which the corn was covered was most remarkably seen whenever the heap was shifted or turned, a day or two sufficing to allow of a large surface being covered. Mr. Haughton thought it worth ascertaining (if possible) whether the nature of the food of the larvæ (Indian corn) had anything to say to the peculiarities of the web mentioned—viz., its great toughness and abundance.

The meeting then adjourned to the month of February.

FRIDAY EVENING, FEBRUARY 13, 1857.

Samuel Gordon, M. D., M. R. I. A., in the Chair.

The Minutes of the previous meeting having been read and signed,—

Mr. W. Andrews, Honorary Secretary, read a communication from Richard Griffith, Esq., LL. D., presenting to the Society a coloured copy of his Geological Map of Ireland, and expressing his gratification at the progress of the Society, and on the enlargement of its sphere of scientific inquiry. Mr. Andrews said that it was very desirable that the Society should possess a copy of this useful Map, and that he felt much pleasure in moving a special vote of thanks to the donor for his exceedingly valuable present, which, having been duly seconded, was passed unanimously.

Mr. G. V. Du Noyer, in presenting to the Society, on the part of Major O'Connor, of Tralee, specimens of a fungus (Polyporus), stated that these specimens were found fourteen feet under a bog near Tralee, and were, in the first instance, mistaken by the peasantry for fossilized "horses' hoofs," which they closely imitated. They had still attached to them portions of oak-bark, and were evidently at one period of their exist-

ence attached to timber. He was not aware that any similar remains had been noticed, but thought records of such things might be of importance in helping to clear up some of the difficulties at present confusing the history of the growth of bogs.

Dr. Kinahan noticed a new species of Crangon, which he had lately discovered on the Dublin coast, and which he proposed to call *C. Allmanni*. The species is allied to *Crangon vulgaris*, the most prominent distinction being that the superior surface of the terminal segments of the abdomen in *C. Allmanni* are sulcated. Full details would be laid before the Society at the March meeting.

Dr. Charles Farran read a paper

ON AKERA BULLATA.

It is more than probable that the question will be asked by some of the members of this Society, why I should occupy its time in bringing forward for discussion a mollusc so well known and so widely diffused as *Akera bullata*. In answer to this question I reply, that I hold it to be one of the pleasing duties imposed on each member to contribute his mite of information to the fund now accumulating in the Transactions of the Society, and which must ere long lead to a more accurate, if not perfect, knowledge of the natural history of our own country. It is by bringing forward a number of facts, and digesting and arranging them, alone, we can hope to solve the anomalies which perplex the student in his pursuit of this delightful science.

My last visit to Birterbie Bay has enabled me to bring before the Society, in the case of *Akera bullata*, a most extraordinary aberration from its normal condition, accompanied by a solution, which I trust will prove satisfactory, of the cause which produced it. At the December monthly meeting I had the honour of reading a paper, in which I detailed the discovery of the locality of the marbled swimming crab, *Portunus marmoreus*. I mentioned that the state of the weather was most unpropitious, although it was July. In fact, after making two or three hauls of the dredge, in which I captured that beautiful crustacean, we were compelled to leave that spot and seek for shelter in Birterbie Bay, and, carried on the top of a mountain wave, we ran down the bay until we opened on Roundstone, and, altering our course, we got under shelter of the highland of Innisnee, an island which, as I formerly explained to the Society, divides Roundstone Bay from Birterbie Bay. Having proceeded a considerable distance up this creek, we found water as still as a mill-pond although a storm was raging above us, and as our speed was slackened, I thought I might as well try the dredge, and accordingly threw it overboard, and had it under weigh for two or three hundred yards, when we found ourselves fixed between two ledges of rock, and imbedded in a sludge of mud and decayed or decomposed Nullipore.

Having ascertained that no damage was done to the vessel, my first care was to have the dredge brought on board, and my surprise was great when fifteen egg-like substances, and fully as large, rolled on

the deck; the resemblance to duck eggs, mottled with brown and purple spots, as if incubated for some time, was most striking. At first sight I took them for some undescribed species of Doris, but on keeping one of them in my hand I found that it gradually elongated and exposed the apex of the spire, but of such size that I entertained doubts as to its identity with Akera. The measurement of the largest when first taken was as follows,—three inches in length, and two and a half in diameter, and the weight, when we reached Roundstone, one and a half to two and a half ounces. When exposed for some short time they gradually contracted their mantles, became more flattened, and thus exposed their shell to some extent. In about an hour after their capture they began to throw out a considerable quantity of thick glairy mucus, exhaling a smell resembling iodine mixed with violets; after this they diminished considerably in size, and still further laid bare their shells, which I perceived were of gigantic size. When replaced in the water they never recovered their full size, but completely covered their shell with their mantle.

The men having extricated the vessel from her unpleasant position, I prevailed on them to make several tacks, in hopes of securing more specimens of this prize. This they did, but without success, having kept close to, but outside, the rock, the water shoaling and the tide receding, preventing us from keeping in our first course. Finding our efforts vain, and the wind lulling, we took the opportunity, and returned safely to Roundstone. Here I had fresh water supplied to the prisoners, and safely locked them up for the night. On giving the matter further consideration, I came to the conclusion that the Akera lived here in shallow water, for I had not more than two fathoms of rope when I first threw out the dredge. I reflected that whatever power the wind exercised, blowing as it did from the land, assisted by the receding of the tide, tended to drive the vessel from the shore; consequently, when we reached the rock, we were considerably outside the line where *Akera bullata* lived, and that we had but touched on them in a slanting or transverse direction, and yet, in that spot of contact had captured fifteen; and further, that tacking outside the rock, we were going into deeper water, and, consequently, further removed from their locality; and, as I observed before, the space between the rock and the shore had shoaled, so that it was impossible for a vessel of our size to go over it.

Having this conviction in my mind, the next day I procured a boat carrying a small lug-sail, and drawing less than eighteen inches of water, and steering to the ground, I had the satisfaction to find that my calculation was correct; for on dredging over the ground laid down in my mind's eye, within the rock, and closer to the shore, the tide being full in, I obtained as many of those magnificent specimens as I desired—thus corroborating the conclusion I had drawn of their inhabiting shallow water.

I shall now explain why I have been so particular in giving those details as to locality and depth. It was in this creek—I might say this very spot—where I obtained, in the year 1844, the rare Irish shell,

Bulla hydatis, and where, in the year 1854, I sought in vain for it, spending hours on hours in search of it, but failing; I had some vain hopes, when I threw out the dredge, I should again meet it; but the result proved I was wrong. In addition to all this, Mr. Barlee, who had investigated most critically Birterbie Bay, surprised at the size of some specimens which I had forwarded to him, expressed his astonishment how it had fallen to my lot to discover such a treasure, after his having ransacked every nook and corner of the bay.

I now exhibit specimens from the collection of my friend, T. W. Warren, Esq., from the locality of Baldoyle, county of Dublin; of course they represent the shell of its average size and appearance; one specimen from my own collection, from the same locality, designated by Mr. Barlee and the late Professor Forbes as a "monster specimen;" and specimens from Roundstone Bay, obtained exactly opposite the creek in Birterbie Bay, and, in a right line, not more than a quarter of a mile from it; and also, the giants themselves. I exhibited to every naturalist in Dublin, who wished to see them, those extraordinary shells. Whether this discovery excited in their minds any interest, it is not for me to determine; but I can safely assert that it was received by my friends elsewhere with something more than surprise.

I shall select from numerous communications the observations of two of the most accomplished conchologists in England—Mr. William Clark, of Bath, and Mr. Barlee, of Exmouth—to whom I had sent specimens, and those certainly not the very finest. Mr. Clark observes:—

"You have indeed favoured me with a most desirable addition to my collection. Mr. Barlee mentions in a letter that you had met with some Goliaths of the Bulla tribe; but my imagination failed to represent specimens of such gigantic proportions. The animal of the *Akera bullata* is of so delicate a texture, that the character of the external and general configuration escape correct observation from spirit specimens; these points can only be correctly observed by one who has the opportunity of seeing the animal contract and display itself immediately on its capture. The presence or absence of a gizzard, and others of the internal points, would admit of a closer examination. If again these creatures should come into your hands, notes bearing on these points would form a bright page in the annals of Natural History."

And in another communication Mr. Clark says he feels great pleasure in contemplating the colossal molluscan growth of some of the species of the Irish seas, which he apprehends results from the stimulus of their being exposed without interruption to the pure Atlantic wave.

Mr. Barlee writes to me thus:—

"Your take of the *Akera bullata* (which is fully three times as large as I ever saw it), so near, I presume, from your account of the spot you ran into for shelter, to the place where I took them the year before, is remarkable—that is, remarkable that I did not fall in with some of those monsters. I had two years' dredging all round that locality without taking the species at all, although about five miles up the bay, in rather shallow water. I once dredged several dozen of what I considered very

fine specimens, being larger than any I had taken from the many localities I had found them in. I suppose it would be in vain to account for the magnitude of your specimens—that is to say, whether it is from age or from some fine fattening ground they are in—because, the species being generally diffused over the bay, how is it, in the hundreds I have taken, that mine are not one-third the size of yours? In Roundstone Bay I also found them abundant, but of the average size of my other specimens. I find that every conchologist can boast of having some species far superior to those in the best collections; and you may rest satisfied that no cabinet can show finer *Pectunculus glycimeris*, *Akera bullata*, and *Kellia suborbicularis*, than your own. These three species I now remember, and there may be others you have that may vie with them."

You perceive Mr. Clark attributes the colossal growth of the molluscs to the stimulus of their being exposed without interruption to the pure Atlantic wave; Mr. Barlee, to age and the peculiar quality of the ground on which the animals were placed. That none of these agencies are sufficient to account for the monstrous growth of these specimens is shown by the fact, that the animal, when exposed without interruption to the Atlantic wave, never, at least so far as our investigation warrants us at present in saying, attain such a size; as is plainly seen in these specimens from Roundstone Bay, which is completely unprotected, or, in other words, exposed to the open sea in that spot whence the specimens were procured; and the inference drawn by Mr. Barlee, as to the fattening quality of the ground, cannot be maintained, inasmuch as the composition of the soil is identical in every creek in both bays, consisting of decayed or decomposed nullipore; and this being a very light substance, is wafted by the tide towards the shore, and forms the margin of all the inlets, and it is on this *Akera bullata* is to be found.

I am sure both these gentlemen will agree with me, that there is one essential condition, probably combined in a degree with each of their suggestions, which should be present to account for this great growth, and that is, perfect tranquillity, or freedom from disturbance; and this state is to be found in an eminent degree in the spot I obtained those specimens. You may recollect I mentioned that, on getting under the high land of Innisnee, we passed from the agitated waters of the bay into water as smooth as a mill-pond, although it was blowing a fearful gale overhead, the wind veering from west to south-west. On carefully examining the locality, I found it completely land-locked, sheltered on every side by high land; and it should be observed that the north and east winds, which on the easterly side of our island produce such a rolling and tumbling sea, on the west coast act in an opposite manner, stilling the water, and not even producing a ruffle on the surface: so that, no matter from what quarter the wind blows, here reigns perfect tranquillity, an essential ingredient in producing great animal development. Another physical fact is worth noticing—frost or snow, when they do occur, seldom last longer than twenty-four hours, and they require to be severe to continue so long; and so very mild in general is the weather on this

island, that fodder is never given in winter to the cattle placed on it, a perennial vegetation amply supplying their wants. I have endeavoured to give an account of this interesting occurrence as briefly as possible.

I should mention that the following morning, on examining the specimens I had placed in the bucket, I found them all dead, some of them being separated from their shells, and floating. My time was so pressing that I could make no anatomical examination of the others I obtained. Some of these I hurriedly put into spirits, but found to my regret, on my return to town, that they were in a state of decomposition. However, I trust at the beginning of our next session to lay, in accordance with Mr. Clark's wishes, a full detail of their structure before the Society, and conclude by stating that the measurement given by the best authorities of those shells, is generally from three-fourths to an inch in length, while those I have the pleasure of exhibiting to the Society are from two to two and a half, and, when recent, three inches in length.

The paper was illustrated by a coloured tracing of the position and bearings of Birterbie Bay, Connemara, and with numerous beautiful specimens of large size of *Akera bullata*.

An animated discussion took place on Dr. Farran's paper, in the course of which Dr. Farran stated that he had been unable to detect any trace of a gizzard in his specimens.

Mr. E. Percival Wright stated that if *Akera bullata* had not a gizzard, it could not be included among the Bullidæ; for he agreed with Mr. Clark, that the presence of this organ was an essential character of the family.

In specimens examined by him, taken near Donabate and at the mouth of the Boyne, a gizzard was always found, and he had little doubt but that future investigation would also detect it in the Roundstone ones. Mr. Wright promised to take an early opportunity of presenting the Society with a detailed account of the anatomy of this species.

Dr. W. Frazer, who had dissected the animal under discussion, could fully corroborate Mr. Wright's statement as to the presence of a gizzard in the Malahide specimens. The species there occurred on *Zostera marina*, yet he could not find any traces of the ravages of the animal on the growing plants; it was a point of great interest as to whether these animals were zoophagous or phytophagous.

Mr. Andrews observed that the magnificent specimens exhibited this evening by Dr. Farran were still further proofs of what was yet to be accomplished on the west coast of this country, and were worthy additions to the valuable records he had already made in the Society, of *Gastrochæna pholadia*, *Pholas papyracea*, *Pectunculus glycimeris*, *Bulla hydatis*, *Teredo norvagica*, and *Portunus marmoreus*. A range of valuable ground yet remained unexplored along the west coast from Blacksod Bay to Kenmare River, especially in the deep-water soundings. *Akera bullata* was very generally distributed around the coasts, and was the favourite food of fish, especially of the turbot. Many species of molluscs,

taken in shoal water and sheltered estuaries, were found of larger size than the same species taken elsewhere, and it might be supposed that the very sheltered position of the small bay described by Dr. Farran, and the soft nature of the ground, probably encouraged the larger growth of these specimens.

Professor Haughton wished to protest against an idea which seemed to prevail in reference to these western rarities, viz., that they owed their peculiarities of distribution, &c., to the influence of an exalted temperature, due to the Gulf-stream. Experiments conducted by the Meteorological Survey, under the Rev. Dr. Lloyd, had completely disproved the existence of any such exalted temperature, the temperature at Bunowen Harbour being found on experiment to be nearly the same as that of Dublin Bay.

Rev. Professor Haughton made some remarks on Euomphalus and Pleurotomaria, recording a new species of Euomphalus from Sheffield, Queen's County, which he proposed to call *E. reginæ*. This paper will appear in full as a monograph of the Irish species of Euomphalus, in the Society's "Proceedings" in June.

The Chairman read a notice of the capture of the Death's-head Moth (*Acherontia Atropos*) at Bandon, county of Cork, on the 6th of July, 1856, communicated through the kindness of Joseph Ball Greene, Esq. This specimen was captured in a loft, attention being drawn to it by its cry, which was described as resembling that of a rat or weasel. The species was stated to have occurred in the same neighbourhood on a previous occasion. The specimen which was exhibited was a very fine one.

After the ballot the following gentlemen were declared duly elected as Ordinary Members:—

Richard Boyle, Esq.; Vere Webb Macnally, Esq.

The meeting then adjourned till March.

EXTRA POPULAR MEETING, MARCH 2, 1857.

Rev. Professor Haughton, F. T. C. D., M. R. I. A., in the Chair.

Professor W. H. Harvey, President of the Society, gave an interesting and lucid address on "The Starfishes of Ireland, and their Relations:" entering into the connexions between their various groups, and illustrating his remarks by diagrams and dried specimens from the Society's collections, and by living examples from Dalkey Sound of the genera Comatula, Ophiocoma, Ophiura, Uraster, Cribella, Solaster, Echinus, &c. In the concluding part of his address he alluded to the relations between British and foreign genera, illustrating his remarks by specimens obtained by him in the Society, Fejee, and Australian Islands.

After a few remarks from the Chairman on the connexion between the living groups and those met with among the fossil beds of the Old Red Sandstone and elsewhere, the meeting separated.

FRIDAY EVENING, MARCH 13, 1857.

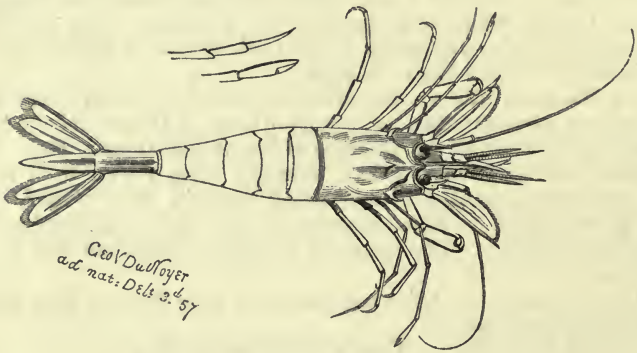
PROFESSOR W. H. HARVEY, M.D., M.R.I.A., in the Chair.

THE Minutes of the previous meeting having been read and signed,—

Mr. R. P. Williams exhibited a fine specimen of the Peregrine (*Falco peregrinus*), killed in the county of Meath, and presented to the Society by Henry Meredith, Esq., through George Annesley Pollock, Esq.

DR. J. R. KINAHAN read a paper—

ON A CRANGON NEW TO SCIENCE, WITH NOTICES OF OTHER NONDESCRIPT CRUSTACEA, AND OBSERVATIONS ON THE DISTRIBUTION OF THE CRUSTACEA PODOPHTHALMIA OF THE EASTERN, OR DUBLIN MARINE, DISTRICT OF IRELAND.



BEFORE proceeding, according to my promise at our last meeting, to describe this hitherto unnoticed Crangon, it will be necessary to review, in a cursory way, the species of this genus already described.

The genus Crangon is now generally restricted to those macrourous Crustacea in which the first pair of legs are subcheliform, that is to say, terminating in a movable hooked claw, articulated to the external angle of the extremity of the terminal joint of the leg, and folding down on a permanent fixed spine, arising from the internal angle of the same joint; the second pair of legs slender, minute, and didactyle, i. e. terminating in a regular-formed hand, with a movable finger; the remaining pairs of legs acuminate and monodactyle; the external maxillipeds subpediform; the internal antennæ inserted on a line above the external, and the eyes free. Thus excluding certain species, which are now grouped under the following genera:—Argis (*Kroyer*). [Eyes concealed beneath the carapace; fourth and fifth pair of legs dilated, natatorial: (*C. Lar.*) (*Owen*).] Sabinea (*Owen*). [Second pair of legs very short, not cheliform: *C. septem carinatus* (*Sabine*).] Paracrangon (*Dana*). [Second pair of legs obsolete: *Paracrangon echinatus* (*Dana*).]

The species referred to this genus are as follow:—

Crangon vulgaris (*Fabr.*).
,, fasciatus (*Risso*).
,, spinosus (*Leach*).
,, sculptus (*Bell*).
,, trispinosus (*Hailstone*).

Crangon bispinosus (*Hailstone*).
,, boreas (*Phipps*).
,, loricatus (*Risso*).
,, munitus (*Dana*).
,, nanus (*Kroyer*).

Of which the first six are recorded as Irish, the first five having occurred in the eastern or Dublin district; to these must be added the species to be now described—*C. Allmanni* (*mihi*).

Leach and Risso divided the species then known into three genera—Crangon, Pontophilus, and Ægeon; of these the two latter have been, by modern systematists, rejected as founded on insufficient characters, and, therefore, not natural groups. There appear to be good grounds for this opinion as regards Ægeon; but it is probable that further study of the homologies of those already known will lead to the re-establishment of Leach's genus, Pontophilus.

This genus was founded for those species in which the second pair of legs were much shorter than the first, the foot-jaws having their terminal joints long and slender, and the carapace covered with spinous lines. Of these characters the second is found to be inconstant; the first liable to confusion; but the third will, I am led to believe, be found constant, although in some species these spinous lines are reduced in number, and even replaced either by single spines, as in *C. trispinosus*, or rows of notches, as in *C. bispinosus*. This division includes *C. spinosus*, *C. loricatus*, *C. sculptus*, *C. nanus* (?), *C. trispinosus* (each row of spines reduced to a single spine, those of branchial regions obsolete), *C. bispinosus*, *C. munitus*.

In Crangon proper, the second pair of legs equal to the first and third; the foot-jaws have their terminal joints somewhat shortened, and we find one median spine on gastric region, and the lateral spines, when present, inserted on the *branchial* region. Under this section are arranged *C. vulgaris*, *C. fasciatus*, *C. boreas* (?), and the new species, *C. Allmanni*. For the present it is, probably, best to unite these two groups, as Bell and M. Edwards have done, into one group, under the name of Crangon.

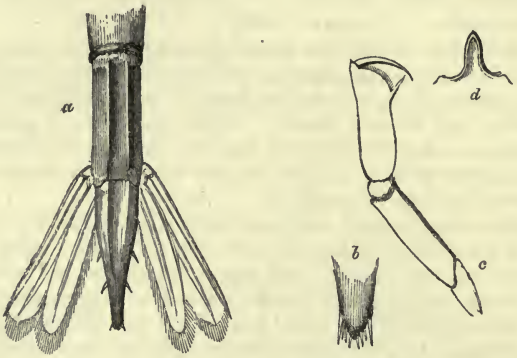
Crangon Allmanni (*mihi*).

C. *Crangone vulgari* affinis. Rostrum frontale brevie. Carapax lævis, spinis tribus armatus, una brevissima regione gastricâ medianâ, duæ regionibus branchialibus insitæ. Abdominis articulus sextus suprà canaliculatus, ultimus supra-sulcatus, dentibus binis utrinque armatus, infra dentibus minutis prætextus. Pedum par primum subcheliforme, brachium læve et inerme. Maribus spinâ sternale brevissimâ, fœminis obsoletâ. Colore albus-cærulescens rufis et aureis punctis maculatus.

Habitat: "Zonam corallinam Maris Hibernici juxta 'Bray,' comitat: 'Wicklow.' Longit, unciæ tres."

Channel-tailed Shrimp.

Spec. Char.—Carapace smooth, excepting a small spine on the median line of gastric region, and one on each branchial; second pair of legs as long as third; sixth segment of abdomen deeply channelled above; channel continued as shallow sulcus on terminal segment; third joint of anterior pair of legs perfectly smooth; a minute spine between insertion of second pair of legs in males; in the female spine, obsolete.



a, tail; *b*, middle plate of ditto; *c*, anterior leg; *d*, rostrum.

This species is closely allied to *Crangon vulgaris*. The carapace is large, rounded, depressed; the rostral projection comparatively longer and more acuminate; the foot-jaws, antennæ acute, and natatory plates of the tail as in *C. vulgaris;* the anterior pair of legs also similar, but wanting the spine which adorns the arm of that species; the spiny armature of the sternum differs strikingly. In *C. Allmanni* there is only one very short spine between insertion of second pair of legs in the male; in females this is altogether wanting. In *C. vulgaris* I find two spines present, one anterior and long, and the other posterior and minute. Middle lamina of the tail is more blunted, and armed with numerous teeth at the extremity, in addition to the four lateral teeth.

The colour is bluish gray, dotted over with brown, red, and gold; length of specimens, from 1·5 to 3 inches.

The channelled abdomen distinguishes it from *C. vulgaris, fasciatus,* and *nanus*. The absence of sculpture on the abdomen, and of spinous lines on the carapace, and the presence of the median spine, separate it from *C. spinosus, sculptus, loricatus, nanus, munitus,* and *bispinosus,* irrespective of other distinctive characters of less importance, as being more or less comparative. The external characters of the shrimps would enable us to separate them easily into various artificial groups, according to arrangement of the spines in carapace, smoothness of abdomen, shape of rostrum, &c.

The following analysis gives the external characters of the various species as far as known. The species in italics are not British.

[M. g. = median gastric region ; l. g. = lateral gastric ; br. = branchial.]

	Rostrum.	Spines on Carapace.	Segments of Abdomen.	Arm.
Crangon vulgaris (*Fabr.*) .	triangular, .	1 m. g., 2 br., . .	smooth, ...	spined.
„ Allmanni (*Kin.*) .	triangular, .	1 m. g., 2 br. . .	6th bicarinated, . 7th channelled, .	smooth.
„ fasciatus (*Riss.*) .	truncate, .	1 m. g., ...	smooth, ...	spined ?
„ *nanus* (*Kroyer*) . .	rounded, .	2 m. g., ...	smooth ?	smooth.
„ *boreas* (*Phipps*) . .	obtusely triangular .	3 m. g., ...	sculptured bicarinated, ...	?
„ bispinosus (*Hailst.*)	triangular .	2 m. g., ...	smooth, ...	smooth.
„ trispinosus (*Hailst.*)	truncate, .	1 m. g., 2 l. g., .	obsoletely carinated, ...	smooth.
„ sculptus (*Bell*) . .	emarginate truncate, .	3 m.g., 16 l.g., 6 br.	3rd—5th sculptured; 6th, 7th bicarinated, . .	smooth.
„ spinosus (*Leach*) .	truncately triangular,	4 m.g., 8 l.g., 4 br.	3rd, 4th carinated; 5th, 7th channelled.	smooth.
„ *loricatus* (*Riss.*) .	truncate, .	7? m.g., 14 l.g., 14 br.,	sculptured.	
„ *munitus* (*Dana.*) .	rounded, .	2 m. g., 2 l. g., 2 br.,	smooth, ...	smooth ?

The first specimens of this species were obtained by me, Dec. 7, 1856. from the fishermen's boats, along with the following other Crustacea:—*C. vulgaris* (?), *C. sculptus*, *Hippolyte varians*, *H. Thompsoni*, *H. Cranchii* (?), *Pagurus Hyndmanni*, *P. Cuanensis*, *Eurynome aspera*, and many zoophytes, inhabitants of the coralline zone. On a subsequent occasion, in February, I dredged the species in 30 fathoms of water, along with the following Echinodermes:—*Ophiocoma neglecta*, *rosula*, *bellis*, *granulata*; *Uraster glacialis*, in great abundance; *U. violacea*, *rubens*, rare; *Echinocyamus pusillus*, *Cucumaria Hyndmanni*. The specimen of *C. Allmanni* then obtained was in ova.

In characterizing this interesting new species, I have united to it the name of one of our Irish naturalists, whose labours in every branch of Irish zoology may be appreciated from the frequent occurrence of his name in the late William Thompson's "Notes on Irish Natural History," and by the monographs published by himself in the Annals and Transactions of many learned societies,—Professor George J. Allman, now of Edinburgh, late Professor of Botany in our own University, and the discoverer of *Polybius Henslowii* on Irish shores.

Along with the species recorded above were specimens in abundance of a Pagurus apparently specifically distinct from, though much resembling the immature specimens of *P. Bernhardus*, but differing in being in spawn much earlier in the year, and in its locality. This supposed species occurs all over Dublin Bay, in 20–40 fathoms of water, but is most common at Bray, where it is constantly brought ashore in the whelk-pots. It almost always is found inhabiting the shells of either *Natica nitida* or *Turitella communis*.

I hope before the close of your session to submit to your Society a

monograph of the Irish species of this genus, at present in preparation, and, therefore, will not now notice it further than as follows:—

PAGURUS EBLANENSIS (*mihi*) (? BERNHARDUS).

Resembling young of *P. Bernhardus*. Hands more regularly globular, very granular; a raised denticulate line marking exterior edge; terminal extremities of posterior pairs of legs scarcely twisted; colour, reddish-white; legs prettily banded with reddish pink.

Among the Crustacea obtained at Dalkey Sound, I find specimens of a very remarkable form of Porcellana, exhibiting peculiarities hitherto undescribed, and which appear specific, the same form having occurred to me at Rush. It seems as well to notice it; and I propose, should it prove distinct, to call it *Porcellana priocheles* (*mihi*) (πριων χηλη).

SERRATE-CLAWED PORCELAIN CRAB.

Allied to *P. longicornis*. The anterior pairs of legs nearly equal; both hands furrowed, scabrous; exterior edges finely but distinctly serrated denticulate in arm, with ternal margin produced; broken up into lobes; front produced, finely denticulate, indistinctly four-lobed; sides of carapace armed with a number of teeth (?).

Colour: Pale-red, with blotches and patches of white.

Habitat: Rush; Dalkey Sound.

I have great doubt whether this is not merely a young form of *P. longicornis*.

In conclusion, I have to lay before your Society a list of species obtained on the Dublin coasts, additional to those noted by me in a paper on the "Crustacea of Valentia Island" (p. 62), as in that paper it only contains those noted by myself, with a single exception. Several more species have occurred. The references used are the same as in my previous paper, and I have omitted the species there noticed.

LIST OF SPECIES.

W. T., Thompson's Irish Fauna; J. V. T., J. V. Thompson's Collection; C. C. S., Catalogue of Cork Fauna; O. C., Ordnance Survey Collection; W. M'C., collected by Wm. M'Calla. The localities uninitialled are on my own authority.

Stenorrhynchus phalangium.—Common laminarian to coralline zones; sometimes thrown ashore; specimens dredged in deep water agree with the details of a form described by Wm. Thompson as a form of *St. tenuirostris*.

Belfast (W. T.), Dublin, Cove (J.V. T.), Dingle (W. Andrews, Esq.), Galway, Killeries (W.T.).

Inachus dorynchus.—Not uncommon; Malahide, Dalkey, same range as last.

Belfast (O. C.), Dublin, Galway, Roundstone (W. M'C.).

Inachus Dorsettensis.—Rarer than *I. dorynchus*.

Belfast (W.T.), Dublin Bay, Cove (C. C. S.), Roundstone (W.M'C.), Killeries (W. T.).

Eurynome aspera.—Rare; Bray, 25 fathoms.

Belfast (W. T.), Malahide (Dr. Lloyd), Cove (C. C. S.), Dingle (W. Andrews), Roundstone (W. M'C.).

Pilumnus hirtellus.—Rare; occasionally washed ashore. A fine specimen thus obtained on North Bull by V. W. Macnally, Esq., 1856; South Bull, 1857. Dalkey, rock-pools.

Carnlough, Antrim (O. C.), Dublin Bay, Youghal (W. T.), Courtmacsherry (Professor G. J. Allman), Lahinch (W. T.), Roundstone (W. M'C.).

Portumnus variegatus.—Merrion strand, common after easterly gales.

Portrush (W. T.), Dublin Bay (omitted in southern lists), Roundstone (W. M'C.), Killala Bay (W. T.).

Pinnotheres pisum.—Common in Mytili and Modioli from deep water.

Belfast (W. T.), Dublin, Cove (J. V. T.), Galway (Prof. Melville).

Atelecyclus heterodon.—Rare. Merrion, under stones, 1854, young specimens.

Co. Donegal (O. C.), Portmarnock (R. B.), Dublin, Dingle (Wm. Andrews, Esq.).

Corystes Cassivelaunus.—Sandy beaches after gales; common.

Belfast (W. T.), Dublin, Cork (C. C. S.), Dingle Bay, 25 fathoms (W. Andrews, Esq.), Roundstone (W. M'C.).

The remainder of the species to be noted appear to have been neglected. Information regarding their distribution is much wanted.

Pagurus Bernhardus, var. *Eblanensis* (*mihi*); (? species).—Dalkey, 15–30 fathoms; Bray, 25 fathoms.

P. Prideauxii (?).—What appears to be this species occurs, though rarely, along with *P. Bernhardus*, in whelk-pots at Dalkey and Bray; also drift-weed, Merrion strand, in shells of *Buccinum undatum*, *Fusus propinquus* and *islandicus*, *Trochus magus*, &c.

Strangford Lough (W. T.), Dublin Bay.

P. Cuanensis.—Dalkey Sound, 10-15 fathoms, rare; Bray, 15-30 fathoms, much more common. Shells in which it occurs coated with *Halichondria suberea?*

Portaferry (W. T.), Cork, as *P. erinaceus** (J.V. T.), Dublin, Galway (Prof. Melville).

P. Hyndmanni.—Dalkey Sound, common; Bray, ditto; Merrion strand, very rare (W. V. Macnally, Esq.). Occurs generally in *clean* shells of *Trochus tumidus* and *Montagui* and *Nassa incrassata.* In spawn in February.

Portaferry (W. T.), Dublin Bay.

P. Thompsoni.—Same localities as last; much rarer. In spawn in March.

Belfast (W. T.), Dublin.

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* The specimen thus marked is in the collection of the Royal Dublin Society. It is too much damaged to judge of its identity. W. Thompson pronounced it identical with the species described by him as above.

Galathea strigosa—Dalkey, whelk-pots; rare.

Belfast (O. C.), Dublin Bay, Cork (J. V. T.), Giant's Causeway (W. T.).

G. nexa.—Merrion strand, 1854; a single specimen, Bray.

Antrim (W. T.), Dublin (Robert Ball); a most puzzling species.

Porcellana longicornis, var. *priocheles* (*mihi*) (? species).—Dalkey Sound; Rush.

Nephrops Norvegicus.—Dublin Bay.

Belfast (W. T.), Dublin Bay, Galway, Roundstone (W. M'C.).

Crangon vulgaris.—In pools; small in size. Merrion strand, Malahide, Bray. In spawn in February.

Belfast (W. T.), Dublin, Youghal (W. T.), Galway, 1857.

C. sculptus.—25 fathoms, Bray, rare.

Dublin, South Isle of Arran (Prof. Melville).

C. trispinosus.—Of this species, hitherto unnoticed as Irish, there are specimens among a number of minute Crustacea, obtained by Dr. Ball and Prof. E. Forbes, off the Skerries, in 5 fathoms of water, in 1845.

C. Allmanni (*mihi*).—Bray, 25 fathoms. Spawns in February.

Hippolyte varians.—Dalkey Sound, Bray, Merrion strand, in drift-weed, rare.

Belfast (W. T.), Dublin, Cork (C. C. S.), west coast, 84 fathoms (W. Andrews, Esq.), Clew Bay (W. T.).

H. Cranchii.—With last, than which it appears more common; some specimens have the apex of the rostrum simple (? species).

Dublin, Cork (C. C. S. and J. V. T.), Galway (Prof. Melville).

H. Thompsoni.—Same localities as last; rare.

North-west coast (W. T.), Dublin.

Pandalus annulicornis.—Very common in rock-pools, and every depth to 30 fathoms.

Co. Down (W. T.), Dublin, Ardmore, Tiraght Rock, west coast, 84 fathoms (W. Andrews, Esq.), Galway, 1857, Killeries (W. T.).

Palæmon varians.—Apparently rare, but probably only unnoticed. Merrion strand, in sand-pools.

Belfast (W. T.), Dublin.

Mysis chamæleon.—Merrion strand, on drift-weed, rare. Malahide, 5 fathoms; Dalkey.

Belfast (W. T.), Dublin, Cork (J. V. T.), West Coast (W. T.).

M. vulgaris.—Merrion strand, pools, abundant.

Belfast (W. T.), Dublin, Cork (J. V. T.), Lahinch (W. T.).

From this list it appears that the Crustacea are fully as well represented on the eastern as on the western shores. Want of sufficiently detailed observations prevent any more particular conclusions being drawn; but, though I have omitted one or two species, such as *Ebalia Pennantii* and *Cranchii*, *Crangon fasciatus*, *Palæmon Leachii*, &c., of which Dublin specimens are extant, the list is a fair average one of the district, and exhibits the remarkable absence of the South British and Southern types, and a great predominance of Celtic and European, just as might be ex-

pected from the position of Dublin, half-way between Ardglass Head and Carnsore Point, between which two points the true eastern marine district of Ireland lies, the great southern province prevailing below the latter point. The new Crangon most probably belongs to either the Celtic or British types, as otherwise the absence from British lists of this conspicuous species is not very creditable to the observative powers of our collectors.

Numerous examples of the several species described illustrated these remarks.

Rev. Professor Haughton corroborated from observation Dr. Kinahan's surmise with regard to Carnsore Point. The shells to the south are very distinct in their types, from those occurring even a very short distance north of this point.

Dr. William Frazer next submitted the following, as the result of his investigations regarding the Fungi presented at the former meeting by G. V. Du Noyer, Esq., from Major O'Connor, and which he had been requested to examine and report on.

REMARKS UPON SPECIMENS OF FUNGI, OBTAINED ADHERING TO OLD TREES UNDER A BOG NEAR TRALEE.

These specimens of fungi were, I understand, obtained adhering to oak timber which lay upon gravelly clay, and was covered by about thirteen feet of bog.

They are evidently specimens of "Polypori," a class of fungi characterized by the presence of innumerable "subrotund pores separated by their dissepiments, and having the hymenium concrete with the substance of the pileus;" and I have also no difficulty in referring them to the second subdivision of this class, namely, those furnished with minute, subrotund (not angular), pores. That they were "stemless and perennial," their numerous layers of growth, the results of successive seasons of development, amply demonstrated. Thus, out of forty-five species of Polyporus described in the Flora Britannica, I am restricted to about thirteen, to which only do these specimens present any analogy, and of these I have little difficulty in deciding that they most closely resemble *P. igniarus*, or the hard Amadou, of which I exhibit a specimen which had been growing for some years past on an old decaying plum tree, and although at first sight it appears to be very different in external form from the specimens from Tralee, I am pretty certain, at least, as to their close relationship. The difference between them in form is easily explained by the mode of attachment and development in both cases. The recent ones adhering to a great trunk, and creeping along its side in successive waves of growth; and the older ones closely resembling in shape a "horse-hoof," to which Mr. Berkely compares them, and which was probably due to their more erect growth on a fallen log of timber. The detection of undoubted remains of fungi in a semi-fossilized state is, I believe, extremely rare, and I am disposed to think that the fact is, as has been stated by Lindley, not to be so much attributed to their positive

infrequency in ages past, as to their peculiar structure, which, being altogether cellular, easily undergoes decay, their mushroom growth being followed by as rapid a decline, and their tissues in but few instances leaving the smallest trace behind by which they can be detected. It is, however, very different in the case of the higher Cryptogamia, which, having well-formed vascular structures, as woody fibre and scalariform vessels, are easily recognised by their fossil remains, minute fragments of the latter tissue especially affording sufficient evidence of their previous existence.

In the instance before us we have, from a fortunate combination of circumstances, specimens of fungi preserved in all their integrity through many ages—indeed, so perfectly, that they are almost as available for microscopic examination as if they grew but yesterday. The circumstances which appear to have conduced to this end were—first, their extremely hard texture, so unlike the majority of fungi, and which rivals that of many kinds of wood; their slow growth, and long persistent vitality, years being passed in their development; and, lastly, their having been buried in Irish bog, which is well known to have such remarkable powers of preserving objects of vegetable origin.

Microscopical sections of the fungi were exhibited.

After the ballot, the Chairman declared W. J. Sargint, Esq., duly elected an Ordinary Member.

The meeting then adjourned till the month of April.

DONATIONS TO MUSEUM.

DECEMBER 12, 1856.

James R. Dombrain, Esq.—*Pastor roseus*, shot at Ball's Bridge.

JANUARY 23, 1857.

William Andrews, Esq.—*Fuligula marila*, breeding plumage, Co. Kerry; *Pirimela denticulata*, *Ebalia Cranchii*, *Ebalia Bryerii*, *Atelecyclus heterodon*, *Maia squinado*, *Portunus arcuatus*, *P. puber*, *P. depurator*, *P. holsatus*, from Dingle; and some molluscs and birds' eggs.

Charles Farran, M.D.—*Portunus marmoreus* (male and female), Roundstone.

Richard Ussher, Esq.—*Colias Ædusa* (male and female), from Ardmore, Co. Waterford.

FEBRUARY 13, 1857.

Major O'Connor, Tralee, per G. V. Du Noyer, Esq.—Specimens of Polyporus semi-fosilized.

Vere Webb Macnally, Esq.—*Portunus holsatus* (wrinkled variety), Dalkey Sound.

John Robert Kinahan, M.B.—*Vespertilio pipistrellus*, Dublin; *Xantho rivulosa*, *Xantho florida* (variety), Valentia Island; *Inachus dorynchus*, *Portunus pusillus*, *Pinnotheres pisum*, *Pagurus streblonyx*,

Pagurus Cuanensis, P. Hyndmanni, P. Thompsonii, Crangon vulgaris, C. sculptus, C. Allmanni (new species), *Hippolyte varians, H. Cranchii, H. Thompsoni, Mysis chamæleon,* from the Dublin coasts.

Mrs. I. Townsend, Rossbegh, per Dr. Kinahan.—*Psammobia vespertina,* from Lough Ine, Co. Cork.

H. Meredith, Esq., per G. A. Pollock, Esq.—*Falco peregrinus,* Co. Meath.

TO THE LIBRARY.

"Natural History Review," for July and October, 1856. From the Editors.

"Transactions of the Natural History and Philosophical Society of Liverpool." Vol. X. From the Society.

"On the Prevention of the Smoke Nuisance." A Prize Essay. By C. W. Williams, Esq. From the Author.

"Geological Map of Ireland, geologically coloured, according to the latest observations." From Richard Griffith, Esq., LL. D.

GEOLOGICAL SOCIETY OF DUBLIN.

WEDNESDAY EVENING, JANUARY 14, 1857.

The President, Lord Talbot de Malahide, in the Chair.

The following noblemen and gentlemen were admitted as Members:—1. Lord Bandon, Castle Bernard, county of Cork; 2. Charles Farran, Esq., M. D., Lower Mount-street; 3. Rev. James M'Ivor, Ardstraw Glebe, county of Tyrone; 4. Marcus Keane, Esq., Beech Park, Ennis.

A resolution was passed unanimously, allowing the President to be elected for five years in succession, instead of only two years, as at present.

Rev. Professor Haughton then read the following paper:—

ON THE PITCHSTONE AND PITCHSTONE PORPHYRY OF BARNESMORE AND LOUGH ESKE, COUNTY OF DONEGAL.

During a visit to the county of Donegal in the summer of 1856, I observed a remarkable series of dykes of felspathic trap and porphyry intersecting the granite of Barnesmore Gap, exhibiting occasionally a tendency to pass into a description of glossy pitchstone. Subsequently I was favoured by James Wood, Esq., of Castlegrove, with some specimens from the mountains beyond Lough Eske, in the same locality, which are genuine pitchstone, passing into amygdaloidal, or rather oolitic porphyry, the cavities being filled with a white mineral, which I consider to be stilbite. As the locality is a new one for pitchstone, and the mineralogical composition of the rock unusual, I thought it might not be uninteresting to place on record its analysis, and the result of my discussion of that analysis.

Analysis of Pitchstone from Lough Eske, county of Donegal.

	Per-centage.	Atoms.	
Silica,	64·04	1·423	
Alumina,	10·40	0·204	0·308.
Peroxide of iron,	9·36	0·104	
Lime,	4·24	0·151	0·322
Magnesia,	none	...	
Potash,	3·63	0·077	
Soda,	2·91	0·094	
Loss by ignition,	5·13	0·570	
	99·71		

Assuming this rock to be composed of quartz, felspar, and stilbite, and writing Q, F, S for the number of atoms of each mineral respectively, we find, since—

$$\text{Quartz} = \mathrm{Si\,O^3},$$
$$\text{Felspar} = \mathrm{RO,\ Si\,O^3 + R^2\,O^3,\ 3Si\,O^3},$$
$$\text{Stilbite} = \mathrm{RO,\ Si\,O^3 + R^2\,O^3,\ 3Si\,O^3 + 6HO},$$
$$Q + 4F + 4S = 1{\cdot}423,$$
$$F + S = 0{\cdot}315,$$
$$6S = 0{\cdot}570.$$

From these equations we obtain readily,

$$Q = 0{\cdot}163,$$
$$F = 0{\cdot}220,$$
$$S = 0{\cdot}095.$$

If we take 314 for the atomic weight of stilbite, which accords with its usual composition, we find the following—

Mineralogical Composition.

Quartz,	7·33
Felspar,	62·55
Stilbite,	29·83
	99·71

It would be very desirable that an investigation similar to the foregoing were made into the composition of the different varieties of the vast and heterogeneous family of trap rocks. The nomenclature of this class of rocks is a reproach to geological science; and no satisfactory classification can ever be made of these rocks which is not based on their chemical and mineralogical, as well as on their physical properties. Why should not such a body as the British Association undertake the task of reducing to order at least the British varieties of igneous rocks? The funds requisite for the investigation could easily be procured, and the zeal of the members of the Association would supply specimens from every locality of interest: and certainly an authorized nomenclature of

igneous rocks proceeding from such a source would carry with it a weight which would go far to establish uniformity of language and precision of ideas on this important, but neglected, subject among British geologists.

Let us take, for an example, the term clinkstone. This is a name given from a physical property common to it with many other rocks, including even limestones. The term was one formed in the infancy of geology, and has come to be used in a sense much more restricted than its original application; it now signifies a fine-grained felspathic rock, of conchoidal fracture, generally of a grayish colour, and containing zeolites as well as felspar. This is the correct meaning of the term clinkstone; and yet it is constantly applied to rocks which contain no zeolites, and some of which are not even of eruptive origin. This confusion as to the meaning of the term has led to the use of various synonyms, or *quasi* synonyms, of which it is sufficient to mention felspathic trap, hornstone, and felstone—the latter recently revived very usefully by the Government geological surveyors. Why should not all these terms, if retained at all, be used in definite senses? The republic of geologists is small, and many of its citizens are well educated; surely there could be no great difficulty in getting them all to use the same language.

At the conclusion of Mr. Haughton's paper, Mr. Kelly commenced the reading of his paper on the "Subdivisions of the Carboniferous Formation in Ireland." The concluding portion of Mr. Kelly's paper was deferred until the second Wednesday in March.

ANNUAL GENERAL MEETING, WEDNESDAY EVENING, FEBRUARY 11, 1857.

Rev. Humphrey Lloyd, D.D., in the Chair.

The following Report from the Council was read, and adopted:—

Your Council offers, as usual, the list of Members at present on the books of the Society, with the corresponding list of last year, showing that the present number of members is 164; while the number last year was 165.

	Jan. 31, 1857.	Jan. 31, 1856.
Honorary Members,	4	5
Corresponding Members,	3	4
Resident Life Members,	17	15
Non-resident Life Members,	34	28
Annual Members,	85	82
Associates,	21	31
	164	165

From this comparison it appears that we have lost one of our Honorary Members, viz., the Very Rev. Dean Buckland; and one Correspond-

ing Member, viz., John S. Kennedy, Esq., C.E., who had been recently appointed to a geological post in India, and died on his way to Singapore to recruit his health; we have also lost ten Associates, in consequence of their having graduated in this University, or left Dublin. On the other hand, we have gained eight Life Members and three Annual Members, as compared with last year's list. On the whole, the position of the Society appears to be very satisfactory, so far as numbers are concerned, for the loss has principally fallen on those members—Honorary, Corresponding, and Associate—who contribute little towards the funds of the Society; while our gain has been in Life and Annual Members, who contribute most to the pecuniary welfare of our body.

Your Council have succeeded, by the aid of the sale of £50 stock, in paying off all the debts which have so long impeded the progress of our affairs; and believe that, in a financial point of view, we are now in a better position than we have been for many years, as the current expenditure is now placed on a scale strictly commensurate with the yearly income; and your Council confidently expect to make each year's income in future pay the whole of the current expenses of the year.

The Council were enabled to bring about this satisfactory state of things by means of their agreement, as to printing, with the Editor of the "Natural History Review," which enabled them, in conjunction with the liberal grant of £25 from the Board of Trinity College, to print, during 1856, the large amount of 180 pages of your "Journal," at a cost to the Society of only £30.

Your Council have made a new agreement with the "Natural History Review," for the year 1857, by which the Society will obtain 250 copies of 128 pages, for the sum of £25. This amount of printing in the "Journal" will meet all the wants of the Society, and we shall obtain the advantage of the additional circulation of 500 copies of the "Review" for our papers, which your Council believe are looked upon as interesting and valuable by an increasing circle of readers.

Among the Annual Members lost to the Society, your Council has to deplore the loss, by death, of Mr. Richard Hitchcock, who had served the Society well and faithfully for many years. The Council has appointed Mr. Blackwood to succeed him—an appointment which they have reason to believe will give satisfaction to the Society.

A change was proposed in the organic laws of the Society by the Council, which was sanctioned at the January meeting by the Society, to the effect that the President may, in future, be elected *five* times in succession, instead of *twice*, which was formerly the rule of the Society. It is hoped that this change will work well for the Society.

The Appendix which accompanies this Report contains full information relative to the names of the 164 members at present on the books of the Society; the list of Societies entitled to receive the "Journal of the Geological Society of Dublin;" the names of the members gained and lost during the year; the donations made to the Society; and the audited accounts of the Society to the 31st December, 1856,—from

which latter it appears that the Society is in the Treasurer's debt to the small amount of £4 19*s.* 2*d.*

H. Lloyd, *Chairman.*

February 11, 1857.

The ballot being closed, the following gentlemen were declared duly elected upon the Council for the ensuing year:—

President—Lord Talbot de Malahide.

Vice-Presidents—Robert Mallet, C.E., M.R.I.A.; Edward Wright, LL.D., M.R.I.A.; James Apjohn, M.D., M.R.I.A.; Professor Harvey, M.D., M.R.I.A.; Rev. Humphrey Lloyd, D.D., S.F.T.C.D.

Treasurers—Gilbert Sanders, Esq., M.R.I.A.; F. J. Sidney, LL.D., M.R.I.A.

Secretaries—Rev. Professor Haughton, F.T.C.D.; Joseph Beete Jukes, Esq., M.R.I.A.

Council—Robert Ball, LL.D.; John Macdonnell, M.D.; Robert Callwell, Esq.; Richard Griffith, LL.D.; Rev. J. A. Galbraith, F.T.C.D.; John Kelly, Esq.; George M'Dowell, F.T.C.D.; Samuel Downing, C.E.; Rev. George Longfield, F.T.C.D.; Samuel Gordon, M.D.; John B. Doyle, Esq.; Dominick M'Causland, Esq.; John R. Kinahan, M.B.; G. V. Du Noyer, Esq.; Alexander H. Haliday, Esq., M.R.I.A.

At the adjourned Evening Meeting the following Address from the President, Lord Talbot de Malahide, was read:—

Gentlemen,—In reviewing the state of our Society during the past year, although it is satisfactory to find no retrogresion, I should have wished to be able to congratulate you on a larger accession of new members. Upon the whole, we have one member less than last year, though, as the loss is principally in Honorary, Corresponding, and Associate Members, we have in reality a gain of nine Ordinary Members. I trust that at the meeting of the British Association in this city steps may be taken to enable us to enlarge the sphere of our operations.

Among the losses we have sustained, that of our Assistant Secretary, Mr. Richard Hitchcock, is much to be deplored. You all know how much we are indebted to his attention to the affairs of our Society, to his punctuality and zeal in carrying out its objects. He was possessed of a very refined mind, and had acquired a very considerable proficiency in various branches of literature, particularly Archæology, with which our science is so nearly allied; and, doubtless, if he had been spared, we might have anticipated receiving many valuable contributions from his pen.

We have also to deplore the loss, by death, of one of our Honorary Corresponding Members, John S. Kennedy, Esq., C.E., who died in India, when on his way to Singapore to recruit his failing health. This gentleman was a gold medallist of the University of Dublin, was subsequently attached to the Irish Geological Survey, and afterwards to that of India, which post, unfortunately, he did not live to enjoy for a length of time

sufficient to develop the results which his known zeal and skill in Geology would probably have led to.

Geological science has also to regret the removal by death of the Very Rev. Dean Buckland, to whose exertions the early progress of English Geology was so largely due. His loss is felt wherever the science of Geology is cultivated, and the detailed account of his labours will naturally be given by the President of the Geological Society of London, of which he was so distinguished an ornament.

Our papers continue to be most valuable, and we have during the past year published a larger amount of them than any previous year, owing to the liberality of the Board of Trinity College, and other reasons which have been adverted to in the Report of the Council. It is not my intention to give a detailed summary of all the papers written by our members and associates; but there are some of so great importance that it is due to the interests of Science not to pass them over in silence. In the first place, our thanks are due to the patriarch of Irish Geology, Dr. Griffith, for the new edition of his "Irish Geological Map," which has just issued from the press. It would be presumption on my part to attempt an eulogium on this great work, now in the possession of an European reputation.

Mr. Kelly's paper on the Palæozoic Rocks of Ireland is a most valuable one. With his accuracy and perseverance, great light must be thrown on the relations of these difficult rocks. He states that the Irish Old Red Sandstone is distinct from the Brownstone of the south (which is, according to him, a member of the Silurian formation), and that it is found always uncomformable to these underlying strata, but conformable to the coal-measures above. The conclusions he draws, both from stratigraphical grounds and from a comparison of the fossils contained in it, are, that it is an integral part of the Carboniferous System, and does not, as contended by Sir Charles Lyell, with regard to the British Devonian rocks, constitute a passage or gradual change from the Silurian to the Carboniferous System, and partake of the nature of both in fossils as well as rocks. Mr. Haughton's paper on the Lower Carboniferous Beds of the Peninsula of Hook, in the county of Wexford, strongly confirms Mr. Kelly's views. This is one of the most important questions affecting Irish Geology, and one to which I request your continued and earnest attention.

Dr. Kinahan has added considerably to our knowledge of the organic remains contained in the Cambrian strata by his observations on the Rocks of Bray Head, where he has discovered the traces or burrows of some annelidan borer. This discovery is particularly interesting, as these tracks are associated with the Oldhamia, which are found most abundantly both above and below them. With this subject is most closely connected the paper of Mr. Salter, who, in the Proceedings of the London Geological Society, describes various fossils which have been found by him in the Longmynd rocks of Shropshire. They consist of:—

1. Markings resembling the holes of marine worms. They are very numerous, and are always parallel in pairs; also tracks of worms.

2. A new kind of Trilobite, by him named *Palæopyge Ramsayi*. This appears tolerably well defined, and is the most interesting Cambrian fossil yet discovered. He also found marks strongly resembling raindrops and ripple-marks, which point out to littoral action and exposure to the atmosphere. These discoveries form a new era in the history of the Cambrian formation.

There is also another subject which has been treated with his usual ability by our Secretary, Mr. Haughton; and, although the detailed results have been communicated directly to the London Society, they are so important, and the manner in which he has conducted this latterly much neglected branch of inquiry, *Mineralogical Geology*, reflects so much credit on our Society, that I am sure you will be glad to hear some of the conclusions to which his analysis leads. The title of his paper is—"A Detailed Analysis of the Granites of the S.E. and N.E. of Ireland." From this it appears that—

1. In the S.E. of Ireland the granites may be classified by the preponderance of potash over soda, and *vice versâ*.

2. The granites of the main chain and of Carnsore are potash granites.

3. The granites of the intermediate groups are soda granites, and reducible to two types—

a. The Croghan Kinshela granite.

b. The soda granite proper.

4. The potash and soda granites differ from each other in a regular manner in respect to the other constituents, as well as in respect to the alkalies,—the most striking difference being the deficiency of silica in the soda granites, this deficiency being made up by the addition of peroxide of iron and lime; and the increase of the specific gravity of the soda granites.

The granites of the N.E. consist of the granites of the Mourne, Carlingford, and Newry districts.

1. The Mourne granite, on being analyzed, shows a striking resemblance to the potash granite of Leinster, except in containing 3 per cent. more quartz. This excess of silica is accompanied by a falling off of the lime and magnesia.

2. The granites of the Carlingford district are of two varieties, both containing a preponderance of potash. The first variety is very like in composition to that of the main chain of Leinster. The second is quite different, both physically and mineralogically. It contains anorthite and hornblende, but no mica. Indeed, it may be called a kind of syenite.

3. Newry granite. There are in this vicinity two kinds of granite. Taking a line nearly N.S. through Newry from Goragh Wood through Wellington Inn on the south to Jonesborough, soda granite is found to the north of Newry, and potash granite to the south.

I may add that, with reference to the age of these rocks, the reviewer of Ansted's "Elementary Geology" ("Natural History Review," 1857, p. 26) classifies the Irish granites as follows:—

1. Granite of Leinster, post-Silurian, but ante-Carboniferous.
2. Granite of Down, post-Carboniferous.
3. Granite of Donegal, Carboniferous.

He also adds that the Cornish granite is also carboniferous.

The advance of foreign Geology continues progressive, although I am not aware of any new fields having been lately opened. The survey of India is going on satisfactorily, and, in unison with the railway system, will do much to develop the immense natural resources of that rich country. In Australia, also, much additional information is gradually obtained. It may be said that the gold mines have acted in the most powerful manner to stimulate the scientific tastes of our antipodean countrymen. From the Cape, also, we are continually receiving interesting details of the extensive chalk formation which runs through the district of Port Natal. The beautiful and accurate Geological Map of Europe, just published by Sir Roderick Murchison, is a great addition to the obligations which we are under to that indefatigable philosopher, and ought to be on the table of every student of Geology.

A remarkable paper has been read at the London Geological Society by Mr. Sharpe, on the last elevation of the Alps. He contends that there can be distinctly traced throughout the Alps three lines of erosion on the sides of the mountains, viz.:—

1. At from 9000 feet to 9300 feet above the sea.
2. At about 7500 feet above the sea.
3. At about 4800 feet above the sea.

From the uniformity of these lines, he concludes that the action must be due to the sea, and not to lakes.

In confirmation of these views, he examined the lines of watershed traceable in the excavation of the valleys. He finds them to range from 9000 feet (*mer de glace*) to from 2500 feet to 2600 feet above the level of the sea. There is also a great amount of *alluvium* formed in the Alpine valleys, and which has been excavated into terraces. These range at a considerably lower level, from about 3190 feet to 1000 feet above the sea.

The communications of Mr. Binney on the Permian Rocks of Scotland (to which formation he considers the red sandstones of the West of Scotland, with the exception of the Annandale beds, to belong); of Messrs. Plant and Brodie, on the Keuper Beds of Leicestershire and Warwickshire,—illustrate the connexion between the British and Continental formations. There has also been made an important discovery in Aberdeenshire of neocomian fossils. It appears that flint and greensand, containing greensand fossils, have been found in that county, and, what is still more remarkable, some of the fossils resemble more those of Scandinavia than of Great Britain. This points to a connexion between the northern cretaceous system and that of Scotland.

A further attempt at subdivision of the Oolite formation has been made by Dr. Wright, who contends, on very good grounds, that the lower oolite sands, which reach a considerable thickness in the south and midland districts of England, really belong to the upper lias. He

comes to these conclusions chiefly on comparison of the fossils with those of Belgium, France, and Germany. Immediately above these sands there is a very remarkable bed, called the *Cephalopoda bed*, which has a considerable persistence through the district, and whose fossils have decidedly a Liassic character.

With respect to Palæontology, I have already alluded to the most important discoveries of new fossils in the Cambrian strata of England and Ireland, by Messrs. Salter and Kinahan.

Professor Owen, in the twelfth volume of the "Proceedings of the London Geological Society," describes a skull of the musk ox, found in a gravel quarry near Maidenhead, and the original fossil is now preserved in the Museum of the College of Surgeons. It does not appear to differ very much from the living variety of the musk buffalo.

The same distinguished naturalist describes the *tibia* of a very remarkable gigantic bird, nearly the size of the ostrich, found in the lowest bed of the Paris *Calcaire grossier*, resembling the *Dinornis Cassuarinus* and other extinct birds in some respects, the gallinaceous birds in others—a new distinct genus. He gives it the name of *Gastornis Parisiensis*.

He also describes, in the same volume, a remarkable collection of mammalian remains, from the red clay of Suffolk, which he pronounces to be, for the most part, of Miocene date. Among these are extinct species of Rhinoceros, Tapir, Wild Boar, Horse, Mastodon, Decranoceros (an extinct deer), Felis, Canis, Bear, and several genera of Cetacea. However, the most interesting discovery to us is that of a bone of the left antler of a deer, resembling the *Megaceros Hibernicus*. This would give the animal an immense range, from the Miocene almost to our times. Professor Owen also mentions that this animal has been found in the Pleistocene brick-earth of Essex.

I cannot conclude without drawing your attention to a most valuable treatise by Mr. Dominick M'Causland, which has been published during the year, and is entitled "Sermons on Stones." I have perused it with great interest; and, although he does not profess to have made any discoveries of new facts, the views he adopts are original, and illustrated in a clear and eloquent style.

Starting from the proposition that—"Whatever has been written under the Divine inspiration cannot be inconsistent with anything created by the Divine Hand—God is truth, and His Word cannot be refuted by His works,"—the chief difficulty is the precise meaning of the word "Day."

Buckland and Chalmers have taken it in a natural sense, and have, therefore, contended that Moses' narrative was not an account of the events which occurred from the beginning of the Creation, but only of certain events which occupied the period of the six natural days which preceded the birth of Adam.

Mr. M'Causland explains it as a period of indefinite duration, in which sense it appears to be frequently used in the sacred volume.

He details accurately the different steps of the Creation (except that he could not be aware of the important recent discoveries in the Cambrian strata), and shows how everything came in its regular order until the creation of man. It is a most valuable addition to our works on Natural Theology; and I trust that so much progress has been made in our science, that neither the enemies of Revealed Religion, nor the almost equally dangerous advocates of untenable interpretations of the Bible, will be able to rest their arguments on the unsoundness or contradictions of geological theories.

WEDNESDAY EVENING, MARCH 11, 1857.

Dr. Croker in the Chair.

The Society met on the above evening, when the following gentlemen were elected members:—

1. Alexander Tate, Esq., C.E., Santry; 2. Geo. Phayre, Esq., C.E., Sandymount.

The reading of Mr. John Kelly's paper on the Subdivision of the Carboniferous Formation in Ireland was continued, and the discussion to which it gave rise was postponed until the meeting in the month of April.

The Rev. Professor Haughton also communicated the following—

NOTES TO ACCOMPANY FIGURES OF SOME DISTORTED FOSSILS FROM THE CLEAVED ROCKS OF THE SOUTH OF IRELAND.

In a short paper published by me in the "Philosophical Magazine" for December, 1856, on Slaty Cleavage and Distortion of Fossils, I have established the following laws from measurements made on fossils distorted by cleavage:—

1st Law.—*If the trace or intersection of the plane of cleavage and plane of bedding be drawn, the greatest distortion or elongation of the fossils lying in the plane of bedding is parallel to this intersection.* (Page 410.)

2nd Law.—*The distortion of fossils produced by cleavage, estimated in a given direction, such as parallel to the intersection of the planes of cleavage and bedding, varies with the angle between these planes, being greatest when the angle is greatest, and least when the angle is least.* (Page 411.)

3rd Law.—*The compression in a cleaved rock is greatest in a direction perpendicular to the planes of cleavage.*

As many persons, not familiar with the appearance of fossils distorted by cleavage, have felt some difficulty in following the argument of that paper, I have thought it desirable to give to this Society a few illustrations of the distorted fossils of the south of Ireland.

I should first premise that in the two plates containing the figures of the fossils the horizontal line is supposed to be the intersection of the planes of cleavage and bedding, and the vertical line is the dip of the bedding in most instances, and never deviates far from that line.

What I call the *Distortion* of a fossil is the quantity—

$$\rho = \frac{m}{n} \times \frac{N}{M}. \qquad (1)$$

In this expression the fraction $m : n$ represents the ratio of the horizontal and vertical measurements of the figures as actually observed in their distorted condition; and the fraction $M : N$ represents the ratio of the same lines when the fossil is in its natural or undisturbed form.

In Plate VI. the Figures 1, 1A, 1B, 1C, represent fossils distorted by cleavage.

Fig. 1 is *Orthis crenistria* from the Carboniferous Slate of Ardoginna, Co. Waterford, with its hinge-line perpendicular to the intersection of cleavage and bedding.

Fig. 1A represents the same fossil from the Carboniferous Slate of Carrigaline, Co. Cork, with its hinge-line drawn out in the line of intersection of cleavage and bedding.

Fig. 1B is a fossil from the same locality as the last, viz., Carrigaline; but so changed by cleavage, both in and perpendicular to the plane of bedding, as to be hardly recognisable. I name it, with considerable hesitation, *Productus caperatus*.

Fig. 1C is a beautiful specimen of *Euomphalus pentangulatus*, distorted by cleavage, from Little Island, Co. Cork, where these distorted fossils occur in great abundance in limestone, and have been frequently, from their form, described as Ellipsolithes, and considered as quite distinct from Euomphalus.

In the Figs. 2, 2A, 2B, 2C, the artist has reduced the distortion in the proportion of 5 : 4. In Plate VII., Figs. 3, 3A, 3B, 3C, the distortion is reduced in the proportion of 5 : 3; and it is evident to geologists acquainted with these fossils that this reduction of their distortion has nearly restored them to their natural shape. In Figs. 4, 4A, 4B, 4C, the reduction of the distortion is continued in the proportion of 5 : 2; and it is very instructive to observe that it has now become a distortion in the perpendicular direction, causing Figs. 1 and 1A to change characters in becoming 4 and 4A.

It is to be remembered that such specimens as 4, 4A, 4C, could not occur in practice, with the intersection of the planes of cleavage and bedding in the horizontal line. In fact, in the figs. 1 and 2, the line of intersection of planes of cleavage and bedding is horizontal; in Fig. 3 there is either no cleavage, or its plane coincides, or nearly coincides, with that of bedding; and in Fig. 4, the line of intersection of planes of cleavage and bedding must have become at right angles to its former position, and be supposed vertical.

Since publishing the paper alluded to above, I have read with care the various papers published on the subject of cleavage by Mr. Sorby, and feel most happy to bear my testimony to their great value. His methods of research are quite different from my own; and I am glad to learn that the few results I have obtained independently, from the con-

sideration of the distortion of fossils, confirm several of his results, which were obtained principally from microscopic examinations of cleaved rocks. One of the most interesting of our agreements relates to the great amount of compression occasionally occurring in cleaved rocks, which I have shown to amount to 10 and 11 degrees of relative compression at Tintagel and Garth—an amount of relative compression consistent with Mr. Sorby's observations, who has commonly observed 6 degrees of compression in well-cleaved rocks. There are several points of difference between my results and those of both Mr. Sharpe and Mr. Sorby, which will, no doubt, be cleared up by further research. The chief discrepancy between us is the following:—Both Mr. Sorby and Mr. Sharpe have observed an elongation in the line of dip (of cleavage?); an appearance which I have not found in any case, except that of South Petherwin, where it exists, but to a very small extent, and can only be discovered by calculation, as it is not sufficiently decided to be very sensible by direct observations.

ON THE SUBDIVISION OF THE CARBONIFEROUS FORMATION OF IRELAND.

BY JOHN KELLY, ESQ.

In the present paper I mean to treat of the several subdivisions of the Carboniferous formation in Ireland. While my chief object is to draw attention to one or two of those subdivisions, especially the supposed calp of Dr. Griffith, and in this case having, according to my views, to deal with an imaginary band of rock, I must be more particular than if I had a real tangible subject, which, in one part of the country, could be compared with other parts of the system. I mean to show that everywhere in Ireland this rock is mentioned as existing, it is a group of another part of the formation that is mistaken, and introduced into that place.

Before I proceed further, I will here observe, that it is not without some reluctance I stand up in this place in opposition to the views of Dr. Griffith—a gentleman with whom, I may say, I spent my whole life, and with whom I gained my own geological experience. He would be one of the first himself to join in correcting an error, if he were convinced of that error. From the great desire there appears to exist among geologists of eminence, within the last dozen years, to have the honour of founding new systems, and the confusion and drawback to the progress of the science consequent upon it, I believe there is no really good, unexceptionable system of the classification of rocks yet arrived at in Geology. It is a new science with us all; and many of its facts are capable of two or more interpretations. One man may account for a fact differently from another; and it is from conclusions drawn from the experience and views of different persons, in several countries, that we may expect to arrive at a satisfactory settlement of opinions on the subject. My convictions happen to be different from those of Dr. Griffith on the subject of his calp; and, however unwilling I may be to differ from him, it appears to me to be the duty of every member of this Society,

when he examines a district, to give to the Society the result of his own experience, no matter with whom he may differ or agree.

This calp is a new subject in Geology. It was not known in any other part of Europe, until it got "a local habitation and a name" from Dr. Griffith in Ireland. Yet, it has not been questioned by any geologist, but accepted at his word, apparently because he was the most eminent teacher of the science in the country, at a time when it was in its infancy. The opinion regarding it was formed almost in the first days of geological knowledge, about the years 1810 to 1813, and before organic remains had been applied to the identification of strata, and, therefore, cannot be supposed to be above suspicion. It appears to me to be a very important subject, as it involves the great question—whether above 1700 square miles of country, coloured on the Geological Map as calp, be not the rocks of the Coal formation, as I believe them to be, and may not have, in some places, a sufficient accumulation of the strata to contain coal? At all events, inquiry regarding it will be useful to the science we have joined together to cultivate, either in getting altered what may be erroneous, or in establishing the views already entertained.

Mr. Kirwan, a man of some repute in science in Dublin about the year 1800, was the first who gave any account of a black argillaceous limestone, got at Donnybrook, Rathgar, and other places in the vicinity of Dublin, to which he gave the name of Calp. His, however, was a mineralogical notice, and bore no reference to any geological group.

Dr. Griffith adopted the name, and gave the rock an important position in Geology, by making it a subdivision of the Carboniferous formation. He divided the mountain limestone into three parts—the lower limestone, the calp, and the upper limestone. The localities where these subdivisions occur are shown on the several successive issues of his Geological Map, and its position in the Carboniferous formation may be seen in the explanatory section at the bottom of the Map.

In the Report of the Railway Commissioners for Ireland, 1838, there are several Appendices. The first of these is an "Outline of the Geology of Ireland," written by Dr. Griffith, who was one of the Commissioners. In this document we have his matured views of the calp described; but, as it is not in the hands of many, and may not ever be reprinted, I shall make a few quotations, to show on what data those views are founded. As I shall have occasion to reply to some of the paragraphs of the "Outline" which I will quote, I think it well to number the extracts as I proceed, for sake of reference. At page 8, and a few of the succeeding pages of this Outline, is given his subdivision of the Carboniferous formation, in substance as follows:—

1. "Of the Secondary Rocks.—We next proceed to the consideration of the great interior valley, which is entirely composed of secondary rocks, consisting of the Old Red Sandstone, Carboniferous Limestone, and Coal, and its accompanying strata."

2. "As far as our present knowledge extends, the following, in an ascending series, appears to be the order of succession of the different groups or assemblages of rocks belonging to each period of deposition:—

"I. Yellow sandstone, limestone, and shale.

"II. Lower limestone.

"III. Impure argillaceous limestone, called calp, black shale, and sandstone.

"IV. Upper limestone."

3. "Lower Limestone.—This division forms by much the most extensive portion of the series in Ireland. In the northern counties of Fermanagh, Cavan, Leitrim, and Roscommon, it is in part covered by the upper division of the series, but in the midland and southern counties, with the exception of the calp valley of the counties of Dublin, Meath, and Westmeath, it forms the surface rock throughout the greater portion of the limestone country."

4. "Calp, or black shale series.—The name 'calp' was given by Mr. Kirwan to the black argillaceous limestone of the neighbourhood of Dublin, which alternates with black shale, and contains flattened spheroids of pyritous clay ironstone. In some districts the lower beds of this series consist of alternations of sandstone, shale, and limestone, more or less pure; in others, the sandstone is wanting, but the upper beds in all consist of thin, alternating beds of impure limestone and shale. In some localities the lower beds, in addition to the sandstone and shale, contain indications of carbonaceous matter; and impure beds of coal, varying in thickness from half an inch to two inches, have been observed: which circumstance, as in the case of the yellow sandstone, has led to so many fruitless trials for coal."

5. Page 10.—"The thickness of the calp series, where fully developed, is very considerable. On the north-west coast of the county of Leitrim it exceeds 1700 feet; though in the county of Cavan, between Belturbet and Ballyconnell, it is not more than 400 feet."

6. Page 11.—"This division is much more fully developed in the northern districts of the Carboniferous Limestone than in the midland or southern; and it was solely from the clear exhibition of their strata, as seen in the precipitous cliffs of the remarkable Carboniferous mountain district of the counties of Sligo, Fermanagh, Cavan, Leitrim, and Roscommon, that the subdivision of the series has been attempted."

7. Page 11.—"The calp and shale division is, perhaps, best developed on the west coast of the counties of Leitrim and Sligo, between Ballyshannon and Benbulben. In this line of section, the strata dip to the southward at an angle of from 2° to 5° from the horizon. The lower limestone of Ballyshannon is succeeded by beds of black shale, containing balls of clay ironstone interstratified with impure argillaceous limestone. These beds continue as far as the parallel of Bundoran, where they are succeeded by a series of alternations of gray, and occasionally reddish-gray sandstone and black shale, with argillaceous limestone. Some of the sandstone beds contain casts of Calamites enveloped in coaly matter; and some thin but irregular beds of coal have been observed, though none worth working have been discovered; and from the nature of the country it is improbable that any such do exist. These beds are succeeded by alternations of black shale, with impure

argillaceous limestone or calp, which form the precipitous cliffs of Dartry mountain facing the west, and which near the summit are capped by the upper or splintery limestone."

8. Again, at page 10.—"Excepting in the northern counties, where the succession of the limestone series is fully and clearly developed, it is almost impossible to determine with any precision on the point where the lower limestone may be said to terminate, and the calp or the upper limestone to commence. In many localities of the midland and southern counties, the black shale or calp series is altogether wanting, or it occurs so sparingly that without a laborious and minute examination it will not be detected."

9. Page 11.—"It would be tedious, and almost endless, to enter into a particular description of the numerous localities in which the calp series occurs in the north of Ireland: at present we need only observe, that the shale district, extending from Emyvale in the county of Monaghan, to Brookborough in the county of Fermanagh, known by the name of the Slieve-Beagh Mountains, has long been considered to be the true Coal formation, and sanguine expectations have been entertained of the discovery of workable beds of coal; but having ascertained that in the order of succession it forms a portion of the calp series, it appears very improbable that these expectations will be realized."

10. Page 11.—"Upper or Splintery Limestone. This rock is of comparatively rare occurrence in Ireland, and its superficial extent is insignificant. Owing to its containing the greater number of the fossil organic remains which occur in the lower limestone, it is difficult in some localities to distinguish between them, particularly where the calp series is wanting, which frequently happens."

11. Page 12.—"In the valley of the Barrow at Carlow, where the whole Carboniferous Limestone series of the south is clearly developed, it would appear that the calp or black shale division is wanting; and that the upper limestone rests directly on the black marble beds of the lower."

12. Page 12.—"In Belmore mountain, the thickness of the upper limestone amounts to 650 feet. In Benbulben, it is 500 feet; and at the eastern base of Culkagh mountain, in the county of Cavan, it is 600 feet."

13. Page 13.—"Millstone Grit. Rocks decidedly belonging to this series are only to be met with in the mountain district surrounding Lough Allen, in the counties of Roscommon, Leitrim, Cavan, and Fermanagh, hitherto known by the name of the Connaught coal district; and in the shale district extending from Drumquin, in the county of Tyrone, to the neighbourhood of Pettigo, in the county of Fermanagh."

I have now come to an end of those paragraphs of the "Outline" to which I mean to have reference; they are thirteen in number.

As the subdivision of the Carboniferous formation stands arranged in this "Outline of the Geology of Ireland," I object to it, and am prepared to maintain that a great part of it is visionary. The subdivision of the limestone, as given at the quotation No. 2, and the descriptions

which explain and accompany it, are not borne out by the facts, as I shall endeavour to show. The geological phenomena which are visible in the counties of Cavan, Fermanagh, Leitrim, and Sligo, may be interpreted, without any difficulty, by means of the three members of the Carboniferous formation set forth in No. 1, the Old Red Sandstone, Mountain Limestone, and Coal Rocks; and these afford a reference for every rock in the localities, described in the most simple manner.

In proceeding to show my reasons for the statements I have made, and my views on the subject generally, I shall notice the quotations from the "Outline" as nearly in consecutive order as I can.

In quotation No. 1, the author says:—"The secondary rocks are divided into Old Red Sandstone, Carboniferous Limestone, and Coal, and its accompanying strata."

It is remarkable that the Carboniferous Slate, that is, a slaty band which lies between the Old Red Sandstone and the Limestone, has not been noticed at all in this "Outline." Mr. Griffith subsequently introduced this member into his classification, as shown upon his recent Maps, and it is a good and true member. It is well developed on the shore at Poulscadden, near Howth; also on the shore near the Martello Tower at Portmarnock, in the county of Dublin; and many other parts of Ireland. With this subdivision, the natural succession in the Carboniferous formation is—

1. Old Red Sandstone.
2. Carboniferous slate.
3. Limestone.
4. The Coal series.

Each of those subdivisions is composed of a different mineral substance from the others. The bulk of the Old Red Sandstone is composed of red sand; the Limestone of lime; and the Coal shales of argillaceous or clayey matter. There are, however, modifications in the subdivisions which require some explanation, into which I shall enter in detail as I proceed.

Athough those subdivisions differ so widely from each other in mineral character, yet, as a whole, the system exhibits the remarkable circumstances:—1. That the beds of which it is composed are parallel to one another. 2. That they rest unconformably on the inferior or underlying rock. 3. That they are covered unconformably by the superior or overlying rock. 4. That this parallelism of the strata clearly points to one great geological epoch, in which the whole suite, from beginning to end, was deposited, without any great catastrophe in the succession.

The Old Red Sandstone is the lowest of those subdivisions. It may itself be divided into three parts:—First, or bottom layer. Red conglomerate, composed of rounded pebbles of white quartz, brown quartz, jasper, and fragments of other rocks, united by a mineral paste. In some localities the conglomerate is composed of flattish, rounded stones of mica slate, as at Cushendall, in Antrim; sometimes of green chloritic slate, or green grit, as at Lane, and at Shenick Island, near Skerries, in Dublin.

Its thickness varies from 20 to 60 or 80 feet in different places. 2. Next is a series of beds of red sandstones and red shales, from 200 to 600 feet thick. 3. The upper part exhibits thick beds of sandstone, of a whitish or yellowish colour. This upper part is the yellow sandstone, which sometimes contains a band or two near the top of black shale, interstratified with thin beds of limestone, full of the fossils of the limestone. This yellow part of the Old Red varies from 50 to 200 feet in thickness. The whole thickness of the Old Red Sandstone in Ireland averages about 1000 feet.

I am aware that this subdivision, which, in former times, was included in the Carboniferous formation, has been recently cut away from it, and joined with another rock, which lies below it, sometimes directly in contact with it, and both together now called Old Red Sandstone. I could wish this separation had never been made, for it blots out a great line of demarcation which nature has made, and which ought not to have been blotted out. Botanists and zoologists, in devising their subdivisions, seek for the strongest lines of demarcation between the groups of their several orders and classes. This golden rule seems to have been totally overlooked in our science. The strongest and most prominent boundary line made by nature in Geology is a sedimentary unconformability. It is the chasm between two formations. It marks the time of a change, sometimes of a great catastrophe, which occurred at the end of one formation, and before the commencement of depositing materials for another. At the end of the Silurian period, and immediately before the Carboniferous formation, there appears to have been a time of unusual convulsive movement in the system of rocks which had then been formed. By this movement the beds were made into great folds, the tops of those folds often broken and carried away, leaving those beds turned up on their edges. This period of time coincides with one of the chasms I have been describing, in which no rock appears to have been deposited.

The conglomerate of the Old Red Sandstone, which forms the base of the Carboniferous system, was the first or lowest deposit laid down on the older beds after the period of disturbance just described. It is spread out, in all places I know, upon the upturned edges of the supporting rocks, in beds varying but little from the horizontal—thus forming the foundation of a new system. Those supporting rocks are different in different places: sometimes mica slate, more generally clay slate, or gray grit, sometimes brownstone, sometimes quartz rock, or porphyry, or greenstone, or granite. I look upon this conglomerate as a most important index in geology. Besides being the beginning of a new system of rocks, it is the boundary between two distinct periods of organic life; the fossils below it differ in genera and species from those above, and, besides this, there is a well-marked difference in the lithological character of the rocks also, the lower and older being much harder and more quartzose; the upper, softer.

The fossil evidence, so far as it goes, supports this view, and forms a link to tie this Old Red Sandstone inseparably into the Carboniferous

formation. Near Cookstown, in Tyrone, there are beds of Red Sandstone near the base of this group, and beds of red limestone, both of which contain fossils common in the mountain limestone. There is now in the Museum of Irish Industry, at Stephen's-green, Dublin, collected by Colonel Portlock, from the river at Kildress, from Red Sandstone in the very lower beds of this group—

Productus fimbriatus,	Spirifer lævicosta,
,, semireticulatus,	Retzia ferita,
,, Martini,	Rhynconella ventilabrum,
Leptæna crenistria,	Cnathopsis fungites,
,, Sharpei,	

—nine species; all common in the limestone.

In beds of red limestone, at Castle Espie, in the county of Down, which occur in the lowest beds of the Old Red Sandstone, there are—

Actinoceras giganteum,	Orthis cylindrica,

and some species of Rhynconellidæ, common in the mountain limestone.

Professor Haughton of Trinity College, has in his Museum the following fossils, got in whitish-brown *sandstone*, near the top of the Old Red, at Porter's Gate, Hook Point, Wexford—

Productus caperatus.	Leptæna crenistria.
,, setosus.	Lithodomus dactyloides.
,, concinnus.	Sanguinolites sulcatus.

These are all common in the mountain limestone and in the Carboniferous Slate.

Besides the foregoing, which are in pure sandstone rock, there are others got in shale and limestone beds, which are interstratified with the yellow part of the sandstone near the top, and in this shale are found fifty or sixty species of the common fossils of the Carboniferous Limestone at Porter's Gate, near Hook Point, and in many other places.

I look upon those fossils got in the Old Red Sandstone—some of them in the bottom beds of it at Kildress and at Castle Espie, some in the middle at Kildress also, and some in the upper part at Hook Point, in Wexford—as a link made by Nature to tie this Old Red Sandstone group up into the Carboniferous formation; and this fossil evidence, together with the physical considerations before mentioned, to be conclusive as to the propriety of leaving the Old Red Sandstone according to the arrangement in which it stood twenty years ago; and, further, I consider the modern mutilation of cutting away this Old Red Sandstone with its conglomerate base, parallel beds, and fossils, from the Carboniferous formation, into which it is tied by nature, as I have described, and joining it to a rock which belongs to an older epoch in the Earth's history, and calling the two distinct things by one name, as has been recently done, as a most injurious infringement on proper classification, and calculated to retard the progress of the science.

The Carboniferous system has thus suffered by recent changes. The

Old Red Sandstone of former days, as just stated, has been cut away from its lower part, and a slice of the New Red Sandstone stuck upon it above. In this change two of the greatest chasms, the most striking boundaries that Nature made between her groups are totally disregarded, that is, the sedimentary unconformability at the bottom of the Old Red conglomerate, and the sedimentary unconformability at the top of the Coal-measures. The old natural Carboniferous system is broken up, and now forms parts of two new unnatural systems. Any of the three new lines made by this change, as boundaries of formations, does not agree with the boundaries made by nature. They are all artificial. Other sciences are improving every day. Geology appears to be retrograding. It is to be hoped still that the Carboniferous system will be restored to what it was before the recent alterations, and that it will recover this fit of illness, brought upon it by too much attention from over-zealous doctors.

I have before alluded to the desire that exists among geologists of eminence to have the honour of founding new systems. The Devonian system, and the Old Red Sandstone (in Herefordshire, in England), are two of those; the Calp, and the Yellow Sandstone (in Ireland), two others; and those new systems, or subdivisions, are some of the results of the recent alterations.

Of the Devonian system I expressed my views in a paper read in this Society last year. I endeavoured on that occasion to show that there is no Devonian system in Ireland—no intermediate group between the Carboniferous and Silurian systems. Every rock and band of rock about the position where that system might be expected falls easily into either the Carboniferous system above, including, of course, its Old Red Sandstone, or the Silurian below.

I find that my views, derived wholly from Irish data, agree with those of Professor Sedgwick, himself one of the authors of the Devonian System, and above whom no one stands higher in this science. He says, in the Introduction to the "British Paleozoic Fossils," p. 23, in speaking of the Devonian:—"In Devon and Cornwall the above series has no base; and we are without any evidence as to the beds which are below the lowest Devonian group." He is right. It is no doubt the same in England and Ireland. Here we have it not at all; it is a thing of the imagination; there it is a baseless fabric. It is to be regretted that so much pains were expended by two of the most able of British geologists on a country penetrated with granite protrusions, and broken up by the faults and dislocations consequent on them. Had half the pains been bestowed on a good paleozoic country, such as Ireland, every fragment of the earth's crust in Devon and Cornwall could afterwards, by combining lithological character and fossils, be put into its proper place without confusion or difficulty.

The Old Red Sandstone of Herefordshire, though not in Ireland, is too closely allied to my subject to be passed over unnoticed. It is a matter on which I have often thought; but, for want of opportunity of such examinations as would be satisfactory to myself, I can only speak

with diffidence. It appears to me that the chief part of the Old Red Sandstone of Herefordshire, described in "Siluria," p. 242, as 8000 or 10,000 feet thick, is a Silurian rock, and the equivalent of the brown rocks between Trillick and Pomeroy, in Tyrone, and the lower rocks about Dingle, in Kerry. In both places in Ireland the underlying fossiliferous Silurian rocks are conformable with the brown grits, which I have in another place called brownstone. So they are in Brecknock and Herefordshire, on the line from Llandeilo by Kingston to Aymestry. In physical characters, too, they agree. For a few days last autumn I examined the country between Abergavenny and Brecon, in Wales, and along the road for several miles south of the latter place I saw those brown, gray, and green grits and slates, and the best eye could not distinguish them from the Dingle grits or slates in grain or colour.

But it is stated that there is a regular passage from the Old Red Sandstone of Herefordshire downwards into the Silurian, and upwards into the Carboniferous system of South Wales. We have the passage downwards from our brownstone into the Silurian fossiliferous bands; but we have no such passage as that described upwards in either the Dingle or the Tyrone district, and it appears to me very doubtful that such a passage exists even about the Vans of Brecon: for it must be there, if anywhere.

Sir Henry de la Beche seems to have recognised an unconformability in this district; for, in the "Memoir of the Geological Survey of Great Britain," vol. i., p. 59, he says:—"On the north of the great coal-fields of South Wales and its supporting limestone the upper part of the Old Red Sandstone forms a range of lofty land, of which the Vans of Brecon attain the highest elevation (2682 feet). From the small angle of the dip the continuation of the beds forming the summits of the Vans is only a few feet beneath the Carboniferous Limestone, near Merthyr Tydvil." Again, at p. 60, he says:—"Proceeding towards Carmarthen, not only do we appear to find a mingling of sand more, at the same geological time, westward than eastward, but also an *overlap of the higher arenaceous and conglomerate series upon the lower and marly accumulations* of the Old Red Sandstone; the Carboniferous Limestone and Coal-measures over the Silurian rocks."

What is this overlap of the higher arenaceous and conglomerate series, and the rest, over the Silurian rocks? It appears to me to be this:—That the conglomerate of the Vans of Brecon, or its equivalent, lies unconformably on the Silurian rocks near Llandeilo, and, of course, also on the Old Red Sandstone of Brecknock and Herefordshire; for, be it remembered, that the two are conformable.

This leads to the conclusion that this Old Red Sandstone is divisible into two parts, the conglomerate and sandstone of the upper part at the Vans of Brecon being the base of the Carboniferous system, and there lying unconformably on the lower or supporting Old Red Sandstone, as it does at Dingle in Kerry, and at Clogher in Tyrone.

As well as Sir Henry de la Beche, already quoted, Professor Sedgwick appears to entertain the same views that I do—mine taken, as before,

from Irish data. He says, in the work already quoted, Introduction, p. 28 :—" Though the Devonian series of the Herefordshire type seems to pass downwards into the upper Silurian groups, it does not appear to pass upwards into the Carboniferous. There is generally a palæontological and physical gap between them, which is in many places obscurely indicated by the upper conglomerates of the Old Red Sandstone."

His upper conglomerates of the Old Red Sandstone of Herefordshire appear to me to be the same as my lower conglomerates of the Carboniferous. His physical and palæontological gap I take to be the unconformability at this point, and the difference of fossil genera and species above and below, of which I have already spoken. Two coincidences of opinion more close than these could scarcely be met with on a subject of this kind.

I have been told that cases occur on the north border of the coal-field of South Wales where the coal rocks, limestone, conglomerate, and all, could be shown lying conformably on the Old Red Sandstone of Brecknock and Monmouth. This, in a few local cases, I can easily believe; for, in the rolls that occur in the older strata in so large an extent, it is very probable that the base of the Carboniferous formation, which has a remarkable persistence here on the great scale, may coincide now and then with the underlying undulations at an anticlinal or synclinal point, though three-fourths of the observed cases along the junction be positively unconformable.

Indeed, the general unconformability of those two may be inferred from a mere inspection of the Map of Siluria itself, with the dips marked on it from the new one-inch Map of England. In Herefordshire and in Brecknock the general strike of the so-called Old Red Sandstone is S.W., and the dip S.E. The strike of the Carboniferous rocks of South Wales may be taken in a general way, in the vicinity of the Vans of Brecon, by the outcrop of the limestone along its northern escarpment between Abergavenny and Llandeilo, and this is east and west. Here the two strikes clash; they do not coincide, but make an angle with one another of about forty or fifty degrees. This shows that the upper or Carboniferous beds must lie unconformably on the lower brown beds, otherwise the strikes of the two groups should be parallel.

The Old Red Sandstone of Scotland, being a part of the subject, calls for an observation. I cannot speak of this except from analogy. It is said to be nearly 2000 feet thick in three mountains in Rosshire—Coulmore, Coulbeg, and Suilvein; and it is reported to be several thousand feet in thickness in Caithness and other places, and to consist of both red and gray grits. So far it resembles the Tyrone brownstone, and the lower rocks of the Dingle district also, which are of Silurian age.

In 1855 I saw a little of the Old Red Sandstone on the north side of the valley of the Forth and Clyde, in Scotland. I believe the conglomerate at Callander to be the base of the Old Red of the Carboniferous formation, and the equivalent of that rock in Ireland.

From what I have just stated, it will be understood that there is a strong conviction on my mind that the Old Red Sandstone of modern

times, as I said before, consists of two parts: the upper, which is clearly tied into and inseparable from the Carboniferous system; and the lower, which is as clearly associated with the Silurian; and as Nature separated them by one of her greatest chasms, so they ought to be separated by man. The name should undoubtedly be retained for one of them; but whether should it be the upper or the lower? My views lead me to prefer keeping the name to the upper, and I shall state why.

In the early days of Geology the division above alluded to was not recognised in England, and the two were packed together where they happened to be in contact, and said to be 10,000 feet thick. Indeed, this may be said to be the case up to the present time. The carboniferous part, however, is far more general in the British Islands than the brownstone, which was included with it in certain districts by mistake or oversight, for want of being recognised. So far, then, as precedence goes, I should say the upper or the base of the Carboniferous should retain the name, and let the Silurian, or lower part, be provided with a new name. I have called it brownstone, to distinguish it from the upper band of rock, but I shall be happy to adopt a better name with the majority of geologists, when it may be found. I do, however, think it highly objectionable to call the two upper and lower Old Red Sandstone, as I have lately heard them called, because the upper is the base of the Carboniferous formation; it lies, as before stated, indiscriminately upon mica slate, clay slate, gray or green grit, primary limestone, quartz rock, porphyry, greenstone or granite, in all which cases, though there is an upper, there is no lower sandstone in contact to keep it company as a counterpart. The Cambrian rocks have been made upper and lower, but they are one great group divided. It is so also in the Silurian. There are upper and lower oolite, and lias, and chalk, and tertiary, but they are always parts of the same group. To make these two sandstones upper and lower, where the lower is absent in nine cases out of ten, and when it is always a rock of another geological epoch, does not appear to me to be either an eligible association or nomenclature.

About Dingle and other parts of the south of Ireland the green, gray, and brown grits, and similarly coloured slates, are so intimately associated by interstratification with each other in thick and thin bands and beds, as to form one inseparable group. The rocks about Brecon in Wales are exactly similar. It therefore appears that the old name graywacke would not be still unsuitable for this group. It would have the merit of keeping out novelty, and abiding by the first name given to those rocks—a thing much to be desired in Geology as well as in Palæontology.

Regarding the arrangements made in pars. 1 and 4, the Old Red Sandstone is in its proper place. The Yellow Sandstone is a part of the same, that ought not to be made a separate subdivision. The Lower Limestone is the lower part of the Limestone. The Calp, I believe, is a pure fiction. The author himself, at the quotations No. 8, 10, and 11, admits it does not exist in the south of Ireland. I expect to be able to show that it is

not in the middle or the north. The Upper Limestone is the upper part of the Limestone, the whole of it being one mass, and undivided, with only trifling exceptions, which I shall particularize; and the millstone grit is the base of the Coal-rocks.

It is remarkable that the Carboniferous Slate, that is, a slaty band, which lies between the Old Red Sandstone and the Limestone, has not been noticed at all in this "Outline." Dr. Griffith subsequently introduced this member into his classification, as shown upon his recent Map, and it is a good and true member. It is well developed on the shore at Poulscadden, near Howth, about Portmarnock Martello Tower, and thence to Malahide in the county of Dublin, and a hundred other places.

At par. No. 2 the Carboniferous Limestone has been divided into four parts:—

1. Yellow Sandstone, which is stated, at page 9 of the "Outline," to be 600 to 1000 feet in thickness.

2. Lower Limestone; thickness not given.

3. Calp, alternating with black shale and sandstone, which is stated, at par. 5, to be, at Bundoran, 1700 feet in thickness.

4. Upper Limestone, which at par. 9 is given as 500 to 650 feet thick.

Besides the Yellow Sandstone, which may be the subject of a future paper in this Society, there are three other divisions made of the limestone in this passage of the "Outline," of which the middle one is the Calp, which is further described at par. 7.

There are four large calp districts in Ireland, shown on the latest issue of Mr. Griffith's "Geological Map."

1. The Bundoran district, which occupies parts of the counties of Fermanagh, Leitrim, and Sligo. It extends from Lough Erne to Bundoran, and thence along the sea-shore to Grange in Sligo. This district occupies about seventy-five square miles.

2. The Slievebeagh district, which lies between Lough Neagh and Lough Erne, extending from Dungannon to Brookborough, thirty miles, and about eight miles wide, or 240 square miles.

3. The Dublin district, which occupies a great part of the counties of Dublin, Meath, and Westmeath, comprising more than 1000 square miles.

4. The Galway district, which lies chiefly between Banagher and Athenry, above 450 square miles.

I shall make observations on each of those districts, beginning with that of Bundoran.

Bundoran is situated on the south coast of Donegal Bay, about three miles to the west of Ballyshannon. It will be seen by a glance at the "Geological Map of Ireland," that, a few miles inland from the northern shore of Donegal Bay, there is a broad, well-developed band of Old Red Sandstone, extending from Dunkineely to Lough Esk, crosses the Londonderry road three miles east of the town of Donegal, and continues for three miles south of it, where it ends abruptly, apparently cut off by a fault. Three miles farther on, and a mile east of the village of Laghy, it appears

again, and in a narrow band proceeds to a mile south of the parallel of Ballintra, where it disappears; and from this to Ballyshannon, five or six miles, the mica slate and limestone are in contact, without the usual intervening Old Red, which is not at the surface at Ballyshannon, nor round thence by Lough Erne to near Pettigo. At this place it again appears, and continues five miles farther north-east to Grouse Lodge. It is there well developed. From this place it curves to the north towards Killeter, and then eastward it extends, in a broad expanse, to Mountjoy Forest, north of Omagh.

I have been thus particular in describing the appearance and the absence of this band at intervals along the mica slate border, to show a reason for what I believe, but cannot see, and that is, that the disappearance of the Old Red at Ballyshannon does not arise from its being absent from its position under the Carboniferous Limestone along the shores of Donegal Bay, but from being buried in a fault along the junction of the mica slate and limestone. It is not going too far to assume that it underlies the whole of the Carboniferous Limestone round the bay.

At par. 7 it is stated that the Calp and Shale division is best developed on the west coast of the counties of Leitrim and Sligo; and more in detail Mr. Griffith describes a section from Ballyshannon to Benbulben. He says:—"In this line of section the strata dip to the southward, at an angle of 2° to 5° from the horizon. The lower limestone of Ballyshannon is succeeded by beds of black shale, containing balls of clay ironstone, interstratified with impure argillaceous limestone. These beds continue as far as the parallel of Bundoran, where they are succeeded by a series of alternations of gray, and occasionally reddish-gray, sandstone and black shale, with argillaceous limestone. These beds are succeeded by alternations of black shale with impure argillaceous limestone, or calp, which form the precipitous cliffs of Dartry mountain, facing the west, and which near the summit are capped by the upper or splintery limestone."

Putting this succession into something of a tabular form, it is—

1. Lower Limestone at Ballyshannon.
2. Black shale, with impure argillaceous limestone.
3. Gray and reddish-gray sandstone, with black shale.
4. Black shale and impure limestone.
5. Upper limestone.

I object to this arrangement and succession for many reasons, which I shall endeavour to explain.

1. I think the sandstone about Bundoran is the Old Red Sandstone, and not calp sandstone, or any other imaginary band of rock.

2. I think the description given of the shales in Bundoran Bay, at the quotation No. 7, is not correct, nor the succession stated in the same paragraph.

3. I think the great wedge-shaped mass of calp about Bundoran, partly described and partly inferred, is a fiction.

4. I think the appearance of Lower and Upper Limestone, described

in quotation No. 2, attributable to a great fault that exists in the vicinity of Lough Erne and Bundoran, and not that there are two separate bands of limestone.

First. Immediately to the west of Bundoran, on the shore, there is a ravine, several yards long and a few feet wide, with perpendicular faces, worn out by the action of the tide. A man can go through this ravine at low water, and lay his hand, on the north side of it, on sandstone rock; and, on the same level, on the south side, he has the black shale and limestone of Bundoran Bay (see Plate VI., Fig. 1). The ravine appears to be on a perpendicular fault, in which the one rock is thrown up to the surface, or the other let down, so as to be brought into juxtaposition with each other.

There is another, a clear case of a similar fault on the north side of Ballyshannon Harbour, at Kildoney, between two groups of rock sandstone and limestone, the beds of both being nearly level, as at Bundoran. By this fault they are brought into juxtaposition with each other. There is no trace of superposition, but only simple contact. The whitish sandstone at Kildoney Point, and that at Bundoran, are both insulated; and this circumstance, with the faults, renders positive proof of sedimentary succession at the junction unattainable. Here, however, are two rocks of different kinds in contact: sandstone and limestone at Kildoney; sandstone and black shale at Bundoran; not one over the other, but one beside the other, separated by a vertical fault; clearly showing the one thrown up, or the other down from its original position (see Plate VI., Fig. 2). Under such circumstances, it is no great wonder that a mistake might be made by a hurried observer who travelled over the country from Ballyshannon to Bundoran, and that he adopted the geographical instead of the geological succession.

I believe similar cases to be numerous in the neighbourhood. The country about Ballyshannon, and the valley of Lough Erne, is beset with faults: some of them are of unusual magnitude, to one of which I shall allude presently.

I consider it more rational to suppose that those sandstones are the top of the Old Red, which we know exists a short way below, and which have been moved relatively upwards out of their original position by means of faults, than to imagine them, and call them calp sandstones, slipped down from a higher place, and resting in juxtaposition with the limestone at Kildoney, or the black shale at Bundoran; this calp sandstone being a rock which was not known in any part of the world before this idea was suggested to Mr. Griffith's mind.

As at Ballyshannon, so in other districts, rocks of different kinds are frequently brought together at the surface by means of faults. A good example of this kind occurs on the shore at Cultra, near Belfast, between high and low water-marks. At this place there are four or five whin-dykes, all cutting through strata which are nearly level, in a direction nearly at right angles to the line of shore (see Plate VI., Fig. 3). The little quay at Cultra is built on one of them. Each dyke is the boundary between two compartments of rock of different kinds: one of

them is red sandstone; another is black shale, of the Coal series; a third, yellow magnesian limestone; a fourth, thin beds of red compact limestone, interstratified with red sandstone and red shale; a fifth, red sandstone again, and so on. Each compartment between the dykes is, say, a block of rock. Some of those have been pushed up, some let down, and, as the strata are nearly level, what was once one continued bed is now broken up, and in position on different levels between the dykes. The surface of the whole group was afterwards worn down to one general plane by denudation. In such a locality a man, stepping across one of the whin-dykes, may get on higher or lower strata by 20, 50, or 100 feet, at one side of the dyke than on the other.

2. My second objection to this classification is this—

The succession at Ballyshannon begins with the Lower Limestone, and is in ascending order, as described in quotation No. 7. This section I interpret in another way. Instead of an ascending succession, I take it to be that the case is reversed, and that, proceeding from Ballyshannon to Bundoran, the geologist, travelling over the strata westwards, is descending, instead of ascending, in the series. The black shales and interlaminated limestones, both in Abbey Bay, near Ballyshannon, and Bundoran Bay, contain a profusion of those fossils, both shells and corals, which abound in the Carboniferous Limestone; and the whole character of this band—limestones, shales, and fossils—accords with the Carboniferous Slate of other places, or that band which lies next below the Carboniferous Limestone almost everywhere in Ireland, and is especially similar in character to the Carboniferous Slate, where the succession admits of no doubt, about Bruckless and Dunkineely, north of Donegal Bay, and in three or four places on the coast of Sligo and Mayo, where Old Red Sandstone, Carboniferous Slate, and Limestone are all clearly visible in succession.

I shall more particularly point out a means of identifying this fossiliferous shale and limestone group when I come to discuss two black shale bands in the Dublin district, the upper one of which, called the Calp of Dublin, is almost destitute of fossils, and such as it does contain are peculiar to itself.

The description of the second member of this succession appears to me to be inaccurate, as if it had been copied from some wrong page of a note-book by mistake. Balls of clay-ironstone have been described in it. In searching for the fossils of the Carboniferous Limestone I examined carefully the cliffs and the northern shore of the river Erne, from Ballyshannon downwards towards the sea, at low water. I also examined in Bundoran Bay almost every bed of rock. The black shale, interstratified with impure argillaceous limestone, is there; but I saw neither beds nor balls of clay-ironstone. Beds and balls of clay-ironstone are usually met with in the coal-shales, and not elsewhere. They abound in the millstone grit district between Pettigo and Drumquin, and in all the coal-shales round Lough Allen; but they do not occur in any Carboniferous Slate that I know. This division is well developed on the sea-shore between Portmarnock and Malahide, in the county of Dublin,

and the geologist may look in vain there, as well as in Abbey Bay or Bundoran Bay, for a bed or a ball of clay-ironstone.

The third member of the succession, the gray and reddish-gray sandstone at Bundoran (which to my eye seems yellow), is not Calp Sandstone, but Old Red Sandstone, which, according to the views I entertain, lies under the Carboniferous Limestone of Donegal Bay, and is thrown up here by a fault. From Bundoran it continues along the shore by Mullaghmore to the base of Benbulben, near Sligo, a limestone mountain with precipitous escarpments and level beds. The fossiliferous shale and limestone in Abbey Bay, close to Ballyshannon and Bundoran, is the Carboniferous Slate, and the limestone at Ballyshannon the ordinary Carboniferous Limestone, being on a low level here, as compared to what it stands in at Dartree and Benbulben mountains, the cause of which I shall presently explain.

Leaving Bundoran again, and travelling southward, there is no doubt at all of the succession. The Old Red Sandstone of that place is covered by Carboniferous Slate, having the same dip and strike. Some of this slate or shale is fine-grained, some coarse-grained, all fossiliferous and interstratified with beds of dark-coloured, impure limestone, which in this district increase in number and thickness in ascending, until they are covered by the gray limestone of Dartree mountain, which crowns the precipice, without any apparent interruption of the succession.

Third objection.—The sandstone at Mullaghmore, west of Bundoran, on the sea-shore, is 209 feet above low water, and dips and accumulates southward, till it forms a band four miles wide, and several hundred feet in thickness. The Calp, which is stated at quotation No. 5 to be 1700 feet thick at Bundoran, including these several hundred feet in thickness of sandstone, is at Drumahaire, twelve miles to the south, diminished, as may be seen on the Map, to a band of insignificant thickness, without any sandstone at all; thus forming a wedge-shaped mass twelve miles long, 1700 feet thick at the north end, and, say, thirty or twenty feet at the south. Can it be believed that such a wedge as this exists in the Carboniferous formation—one of the most remarkable for the persistence and parallel arrangement of its groups—One in which a bed of coal, or a bed of fireclay, two or three feet thick, has often been identified through a district for ten, twenty, or thirty miles?

Fourth objection.—Since the limestone at Ballyshannon, and the sandstone at Bundoran, may be matter of dispute, let us leave this debateable ground, and take the millstone grit. The base of this rock is as easily determined, and as certain as any boundary line between different rocks in geology. I may say it is particularly so in the west of Ireland, because the rocks are well exposed in precipices and high hills, and at this base form a junction of black shale and gray limestone—two rocks so entirely different in colour and mineral character as to be in no way likely to be mistaken for one another, or the line between them for any other line.

At par. 13 it is stated that "the shale district, extending from Drum-

quin, in the county of Tyrone, to the neighbourhood of Pettigo, in the county of Fermanagh, decidedly belongs to the millstone grit." This rock occurs also on the high mountain group south-west of Lough Erne, as shown on the "Geological Map." The base of this millstone grit, at Portinode, between Kesh and Pettigo, on the north shore of Lough Erne, stands at the level of the water, or about 150 feet above the sea. At Shean Hill, west of Churchhill, on the south side of the lough opposite, it stands at 1135 feet, that being the height of the trigonometrical point on the top of the hill, on limestone, near the base of the millstone grit. Here is a difference of 985 feet between two localities in the base of the same group, showing the base of the millstone grit to be lower on the north shore of Lough Erne than on the south by 985 feet, or, say, about 1000 feet; and the fact proves that a fault of great magnitude exists between them, as there is no curvature of the strata, and the rock in both places has a persistent dip southwards.

The seat of this fault, as I interpret it, lies on the northern boundary of a sandstone belt, seen on the "Map," which runs from the north-west corner of Lough Erne to Bundoran, where it enters the sea. In estimating the amount of the fault, these 985 feet of horizontal difference would make half as much more, or about 1500 feet, if the dip at Portinode be persistent under the lough southwards as far as the fault, which is very probable, as the rocks visible in both places have the same low, general dip to the south, as just mentioned.

This fault I look upon to be the key to the geology of the district round it. By means of it, all the phenomena in its vicinity can be explained. With the millstone grit, of course, go up or down all the subdivisions of the Caboniferous formation, at one side or the other, of a fault which passes through them, and all the Carboniferous rocks north of the line of fault are, therefore, on a lower level than on the south of it by about 1500 feet (see Plate VI., Fig. 4).

Again, the surface of the limestone country at Ashbrook, near Ballyshannon, on the north side of the fault, stands at 150 feet above the sea, and on the south side of it, the trigonometrical point on the "Ordnance Map" is 1712 feet on Dartry mountain, making here, near the meridian of Bundoran, a horizontal difference of 1562 feet, or a real difference in the amount of the fault of more; taking into account the amount gained by the dip, which, as at Lough Erne, is southward all through. This fact between Ashbrook and Dartry, on the upper surface of the limestone, affords a corroboration as to the amount of the fault, of the case, at Portinode and Shean Hill, both on the millstone grit.

In this particular fault, because it cuts through a formation, the beds of which are all parallel, there is provided at one side of it a duplicate for every band of rock on the other, though those duplicates occur on levels far different; and since there are in the district four distinct bands of the Carboniferous formation, that is, millstone grit, limestone, Carboniferous Slate, and Old Red Sandstone, so there are in the vicinity of the fault two millstone grits, two limestones, two Car-

boniferous Slates, and two Old Red Sandstones; but I need scarcely repeat that every duplicate band on the low, is also an equivalent of the corresponding band on the high, side.

Although there is no geological fact in the west of Ireland more palpable than this, that the base of the millstone grit to the north of Lough Erne, near Pettigo, stands on a level 1000 feet lower than at Shean Hill, on the south of it, yet this fact seems altogether to have escaped Mr. Griffith's observation. Had he noticed this feature, he would have been able to account in another way for limestone occurring on a low level at Ballyshannon, and high at Dartry mountain, without calling the first lower limestone, and the second upper; thus making two bands where there is actually but one, and, filling up the intermediate space with an imaginary creation, a band of calp 1700 feet thick, giving it a false position and a technical name. He would have seen that there is no more reason for those upper and lower limestones than there is for the millstone grit at Pettigo and that on Shean Hill being called lower and upper millstone grits. In both cases they are geological equivalents, or dislocated portions of the same groups of beds.

It so happens in the vicinity of Bundoran that the two Carboniferous Slates, with the upper part of the Old Red Sandstone between them, come in contact at the surface, partly by ordinary succession, and partly by juxtaposition (see Plate VI., Fig. 5). These three bands, in the position in which they occur, appear to have suggested the origin of the calp, that is, two bands of black shale with a band of sandstone between them, as described at the quotation No. 7, and shown on the explanatory sections on the large and small "Geological Maps." Be it remembered that those three bands do not occur in any vertical section. They are spread out over about two miles of ground. The two upper bands are in succession, as in all other places. The eastern band of Carboniferous Slate is not another band, but the equivalent of the western, separated by dislocation.

From these statements it will be seen that by my interpretation of the facts visible about Ballyshannon and Bundoran, Mr. Griffith has mistaken the succession in the stronghold of his calp; and, if my views be correct, the whole band of 1700 feet in thickness must vanish, and be distributed to other divisions of the formation.

It might be supposed that nothing but the most undeniable testimony would be put forward as a basis for a new band or subdivision of a rock formation, and that when this band of Calp, which was not known in the world before, was stated to exist between two limestones, there ought to be a reference made to some place where such band might be seen in its natural position, with the limestone above and below it in direct contact, and in a section which could not be disputed. Such a sight is nowhere in Ireland to be found,—where there is lower limestone, there is no upper in the same section; where there is upper, there is no lower. There is no lithological mark in colour or texture by which the volume of the lower can be known from the upper. The fossils are the same in both. In fact, the two are similar in every

respect, and were once joined and continuous in the same band, though now separated from each other in some localities by dislocation, to the amount of 1500 or 1800 feet in difference of level.

If geologists who may hereafter examine this district should think my views correct, I need say no more about the calp, as this is the locality in which the idea of its existence, as a geological subdivision of the Limestone originated, as stated in the quotation No. 7; and if it be not here, it is not anywhere. The sandstone at Bundoran I take to be the Old Red, and the black slate, on both sides of it, the Carboniferous Slate in position, as I have described, and the geological place of all below the limestone.*

The sandstones of the other calp districts of Ireland are not Old Red Sandstone, but the sandstones of the Coal series. As, to show this, depends on arguments which constitute a different kind of proof from those just advanced of the truth of the views I take, I shall, therefore, proceed to notice them.

To the west of Lough Erne a calp sandstone is shown on the "Map" in a band of irregular breadth, from Churchhill, by Derrygonnelly, to Lisbofin, near Enniskillen. This is Old Red Sandstone, the equivalent, and in exactly similar circumstances, with that at Bundoran, being

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* Strangers reading this paper may ask, who is this that has written a paper against Mr. Griffith's views on the Geology of Ireland? Some obscure individual against a man of European reputation! For the information of such, I shall state a few facts:—I spent nearly the whole of the business-part of my life in Mr. Griffith's employment. I engaged with him in the spring of 1814. He was then Mining Engineer to the Dublin Society. The first work I did for him was to copy the manuscript and assist in making the map and sections of the Leinster coal district, his own first "Geological Essay," which was then preparing for the Dublin Society for publication. For eight years afterwards I accompanied him, a part of each year, in his geological excursions, surveying, drawing maps, and tracing rock boundaries, drawing diagrams, and making mining models for his lectures. We began, in 1816, a section across Ireland, beginning with the Mourne mountains, and ending at the sea near Sligo. The heights were measured with barometers. He met with an accident, which disabled him, about the middle of this journey, and had to stop at Castlesaunderson, and I continued the section alone. In 1822, when he was appointed, by the Lord Lieutenant, Civil Engineer over the south of Ireland, I assisted—surveying, estimating, and marking out new lines of road, then completing some of them, and building the bridges,; and here the knowledge I had acquired of Geology was important, enabling me, by following the strike and outcrop of the bed of rock, to discover many useful quarries, in places covered with bog or drift, where they were not known before. In 1830 I was transferred to the General Valuation of Ireland, then commencing. In this work I was every day on strange ground; marked the kinds and dips of the rocks on the maps I was using; and from this to 1850 I visited every barony in the three northern provinces of Ireland; I collected fossils in about 300 localities; I was at Bundoran, a place which is the subject of dispute in this paper, for several days. Mr. Griffith and I were there together one day. I showed him much of what I had previously observed; but he had not time to see all. If experience be useful, I had the best of it here, for I was as many days in it as he was hours; and so in most other places in the north. My opportunity there was good, and my attention unremitting. To the Geological Society of Dublin is now due the credit of raking up errors that might have gone on to posterity uncorrected, or even unnoticed, but for them.

thrown up by dislocation, or the adjacent limestone let down, and the two put in juxtaposition with each other by a fault along the eastern border of the sandstone, which has an approximate parallelism with the adjacent shore of Lough Erne.

Knockninny, a high, insulated, limestone hill, on the west side of Upper Lough Erne, rests also on calp sandstone, which appears at its western base, as shown on the "Geological Map." This is probably a continuation of the Derrygonnelly band, and, like that, the equivalent of the Bundoran sandstone.

Although these three sandstones are detached, the limestone which lies above them forms to the eye a continuous range of precipices, beginning at Knockninny, and proceeding by Ben Naghlin, Florence Court, Belmore mountain, Knockmore, Shean, Dartrey, and Truskmore mountains, to Benbulben and the vicinity of Sligo. There is no mistaking the limestone in this mountain group, for it may be traced by the eye for miles before the traveller in the precipitous cliffs which abound along this line, almost without interruption. The sandstones just alluded to, though detached from each other, being at a fixed distance below the limestone, the strata of both being parallel, their true relative position also becomes known.

From much experience and observation, I have come to the conclusion that there is but one great group of beds of Limestone in Ireland. There are intercalations in it below of thin beds of shale and thin beds of limestone in the passage from the underlying Carboniferous Slate into the Limestone mass; and there are intercalations of a similar kind in the passage upwards from the Limestone into the Coal rocks in certain localities. But, as a general rule, I say, that in Monaghan, Cavan, Leitrim, and Sligo, in Clare, Kerry, and Cork, in Tipperary, Kilkenny, and Queen's County, there is but one band of Limestone.

The second district, marked on the "Map" as calp, has been called the Slievebeagh district. It is a band about eight miles wide, stretching in a south-western direction between Lough Neagh and Lough Erne, by Dungannon, Caledon, and Aughnacloy to Brookborough. On looking over a "General Geological Map of Great Britain and Ireland," it will be seen that this band is a continuation of the Carboniferous valley of the Forth and Clyde, in Scotland. A district of graywacke slate and grit bounds them on the south in both countries; and, though there are some exceptions, mica slate is the prevailing rock on the north all the way from Aberdeen to Ballyshannon.

This valley appears to have existed before the deposition of the Carboniferous formation, and was a natural depression, in which that formation was deposited. The S. W. strike of the valley of the Clyde is fair across the channel to the county of Antrim, where the Coal rocks reappear, and, no doubt, are under the Permian and chalk formations below the great basin of Lough Neagh. They emerge again at Coal Island, in Tyrone, and are produced thence in the same direction to Brookborough, filling up the hollow between Monaghan and Clogher. It would not require any great stretch of the imagination to follow this line to the black

shales and sandstones of Slieve Rushen, near Swanlinbar, and the country about Lough Allen, called the Connaught Coal district, and to imagine them all at one time connected. No one will deny that the Coal districts of Great Britain—perhaps of Europe—were deposited at the same geological period, and under the same conditions.

On this account I may here observe, that it appears to me inconsistent with geological reasoning to suppose that any such great wedge of calp as that described between Bundoran and Drumahaire could have been deposited in one place, and no calp at all in another place, the two only a few miles distant, in any such general system of deposition.

From several considerations, I am of opinion that the Slievebeagh mountains, shown on the "Map" to represent calp, are of the Coal formation. The limestone at Monaghan dips north-west and at Clogher south-east under them (see Plate VI., Fig. 6); thus showing that the shales, sandstones, and ironstones of the Slievebeagh district rest on limestone in the same way as the shales, sandstones, and ironstones of the Castlecomer district does, or as the Munster and Connaught Coal districts do, or, as a part of the same band does, the Coal Island district near Dungannon.

Mr. Griffith says of this locality, at par. 9, that "the district of the Slievebeagh mountains has long been considered to belong to the true Coal formation, and sanguine expectations have been entertained of the discovery of workable beds of coal; but having ascertained that, in the order of succession, it forms a portion of the calp series, it appears very improbable that these expectations will be realized." Having a theory fixed in his mind that there must be a Lower and an Upper Limestone, with a band of calp between them, and finding in the Slievebeagh mountains that there is but one limestone, or that there is no Upper Limestone, he concludes, of course, consistently with his theory, that there was no coal which in position could only be found overlying that Upper Limestone.

It will be seen by reference to his "Report of the Tyrone Coal District," in the Table of "Strata," at p. 16, that the first bed of coal is 211 yards above the limestone at Drumglass, near Dungannon; and he shows, at p. 39, that in the immediate vicinity of Coal Island there are seven workable beds of coal, amounting to 34 feet in the aggregate thickness, and that all these beds are in 196 yards of thickness of the strata, from the lower bed of coal to the upper, or 407 yards from the limestone to the upper bed, including them all.

At Dungannon Mr. Griffith has drawn a line across the country to the north-west, marking the eastern boundary of the calp of the Slievebeagh district. On the east side of this line are limestones, shales, and sandstones; on the west side of it are similar limestones, shales, and sandstones. Thus the rocks are the same on both sides of the line, and there is no reason why a boundary line should be made at this point, only that coal has been worked on the east side, and no coal yet discovered on the west.

On this part of the subject it appears to me that the limestone at

Drumglass and the limestone at Monaghan are geological equivalents, and that the group of shales and sandstones which overlies the Drumglass limestone, and which contains the coal-beds, is the equivalent of the shales and sandstones of the Slievebeagh group, which may also contain coal. If there be 211 yards in thickness of shale and sandstone strata over the limestone in the Slievebeagh mountains, there should be as good a chance of getting the first or lowest bed of coal there as at Drumglass. I never examined the country in detail with a view to determine this thickness, and am, therefore, not competent to say whether coal is likely to be found there or not; but it depends on the thickness of the strata of this group existing above the limestone.

In corroboration of this view, I will state that Colonel Portlock, in his "Geological Survey of Tyrone," &c., made a large collection of fossils. A part of the collection is deposited in the Museum of Irish Industry at Stephen's-green. Among the plants are Stigmaria, Sigillaria, Lepidodendron, &c., from the coal districts of Ballycastle and Coal Island. Specimens of Stigmaria, as good as any of those, are to be seen there, from the sandstone of Carnteel, near Monaghan, eight miles to the south-west of Dungannon, in the middle of the country, coloured on the "Map" as calp. Colonel Portlock's survey appears to have ended before he got so far south as the Slievebeagh mountains. However, in spite of the boundary line drawn at Dungannon, coal plants have been found at both sides of it alike.

Mr. Griffith in his early life got imbued with a horror of the calp phantom, and in the reports he wrote on the subject of mining he warned proprietors to beware of trying for coal in the calp. In the Report of the Connaught Coal District, in a note at bottom of page 9, he says:—"Many fruitless trials have been made in search of coal in different parts of the calp country by ignorant miners, who mistook the black slate clay, with which it is interstratified, for the slate clay which forms a principal member in the coal series."

When a theorist once takes a certain view of a subject in geology, and wishes to make out something new, every fact that appears to support that view is greedily adopted and enlisted into the service, while the facts which tell against it are rejected. Since the period of the discovery of the calp sandstone at Bundoran by Mr. Griffith, every insulated patch of sandstone in Ireland associated with black shale, which is not clearly below the bottom or above the top of the limestone, has been called calp sandstone.

The two other calp districts alluded to, with this, comprise together between 1700 and 1800 square miles. This, instead of a barren calp, may possibly, at least a part of it, turn out to be a fertile coal district. I am not, however, so sanguine as to hope there may be coal in all this area: on the contrary, I know there is not; that a great part of it is the shale which forms the base of the Coal series, and has not sufficient thickness over the limestone to come up to the coal-beds; but, even if there were coal in one-tenth of the area, see what an effect it would have on the

prosperity of Ireland. A square mile of coal, a yard thick, would yield above three millions of cubic yards.

At all events, the Slievebeagh district, being the geological continuation of the Glasgow valley, where thick and numerous beds of coal are worked, and those beds repeated in the small but rich colliery at Coal Island, in Tyrone, afford strong grounds to presume that there may be coal here, though not yet discovered. Whether or not, Mr. Griffith's opinion, as given above, and also at par. 9 of the quotations, emanating from so high an authority, if allowed to go forward to posterity without being contradicted or corrected, would be so far mischievous that it would have the effect, in all future time, of preventing any proprietor or geologist from even examining the district with a view to discover coal.

The Dublin calp district is the third in the list I have made; but, before entering into details regarding this, I shall make a few observations relating to the black shales which are associated with the Carboniferous rocks.

The Carboniferous Limestone of Ireland, in almost all places, has a blackish, shaly band immediately under it, which has been called Carboniferous Slate. It has also a black shale over it, called millstone grit, or the base of the coal shales. Those two black shales are different in character, and require each a short description, because, in the Dublin district especially, both of them occasionally take an important part in the supposed calp.

The lower shale, or Carboniferous Slate, consists of alternate beds of black shale and dark-gray limestone, the shale prevailing towards the base, and the limestone prevailing upwards, where the shaly beds become mere thin partings between the limestone beds, and then disappear altogether, the rock becoming a pure limestone. The limestone beds of this group are generally of a dark-gray colour, composed often of pure limestone, and filled with stems of Encrinites and other fossils. This whole band is generally highly fossiliferous, having corals and shells both in the limestone and in the shale or mud beds. This group is well exposed about the Martello Tower at Portmarnock, and thence along the shore to Malahide; also at Abbey Bay and Bundoran Bay, near Ballyshannon, as already noticed, and many other places. This description applies to the Carboniferous Slate almost everywhere.

The upper shale, or that which overlies the limestone, is not like the lower. Of this band there are three different types: one in the south of Ireland, in Munster, and Leinster; a second in the middle district, lying between Dublin and Galway, and a third in the north, in the province of Ulster.

In the southern type the black shale lies directly and abruptly on the gray limestone, without any passage from one into the other. It is well seen at Old Leighlin, near Carlow; at Abbeyleix; near Cashel and Killenaule, in Tipperary; at Kilfenora, in Clare; at Ballybunnion, in Kerry; at Foynes, in Limerick; and between Buttevant and Mallow, in Cork.

The second type is to be seen about Dublin, where there is a series of beds of two kinds of rock, alternating with each other—one a black, impure, argillaceous limestone; the other a black shale,—those alternations forming a passage from the gray, pure limestone into the coal shales above. This is well exhibited in the railway cutting between Inchicore and Hazelhatch, and also at Clontarf, both near Dublin; it is seen in a quarry at Malahow, two miles south-west of the Naul, in the north of the county; it is visible also, on the road side, one mile east of Balla, in the county of Mayo, where there is a similar passage from the limestone into the overlying coal shales of Slieve Corran, a millstone grit mountain.

In the northern type there are alternations of three kinds of rock,—limestone, shale, and sandstone,—and each of the three occurs both in the Old Red Sandstone and in the limestone. There is a good section in the cutting of the canal at Benburb, six miles north-west of Armagh, where there are three or four bands of sandstone, and as many of limestone and shale, in the passage from the main body of the limestone upwards.

In fossils there is a strongly marked difference between those two shales. In the lower group, or Carboniferous Slate, as said before, the thin beds of limestone are generally pure, and in both the limestone and the shale corals and shells are abundant, and of the kinds found in the limestone above; whereas, in the upper passage, in the middle district of Ireland especially, the beds of limestone are black, argillaceous, and impure, and neither those beds nor the shales, with which they are associated, contain any fossils, so far as I know. Above the passage, however, in the coal shales, fossils appear; but the fossil mollusca of those black mud beds are different from those that occur in the limestone. A few species of Posidonomya, of Goniatites, and of certain Pectens, all with wonderfully thin shells, as if they had lived in fresh water, are the prevailing kinds, and they are not abundant, except in the beds a short way above the limestone. They are found in the black shales on the shore of Lough Shinny, near Skerries; in the railway cutting at Baldongan, near Lusk; at Garristown, and at Walterstown, in Meath; and they are very fine at Corry, at the north end of Lough Allen, where the Shannon comes into it; also to the west of Inchiquin Lake, in Clare. I may add, that I never found a *Posidonomya Becheri*, nor a *Pecten papyraceus* in the Carboniferous Slate, though I searched that band well for fossils in above 150 localities in Ireland.

Of the three foregoing types of the passage from the limestone into the upper or coal shale, that one about Dublin is that with which I have most to do at present, because the typical rock is one of the members of the supposed calp.

It may be interesting to remark, that in England, at the passage from the limestone into the overlying coal rocks, there are three types corresponding to those in Ireland. In Derbyshire it is the same as in Kilkenny; in Lancashire, the same as in Dublin and Meath; and in the north of England and Scotland, the same as in Antrim, Tyrone, Mo-

naghan, and Fermanagh. Those three types happen also, on both sides of the Irish Channel, to correspond in the general geological strike, and the rocks of Dublin are a continuation of the rocks of Lancashire, connected, too, by a link in the Isle of Man, all of the same type. These three English types are well described in Phillips's "Geology of York;" and in the middle type he not only describes accurately the passage from the limestone into the overlying coal shales, but the country afforded him opportunities of giving actual measurements of the thicknesses of the alternating bands of shale and black limestone in several sections. Such opportunities, however, do not offer in Dublin, as the country is low, flat, much broken up by faults, and covered with drift.

With the Dublin district I begin by stating that there is a detached patch of the bottom of the coal shales at Kiltegan, about a mile northwards from Clonmel. To the south and south-west of Fethard, at Barretstown and Gurrane, there are two of the same kind; east of Cashel are two more of a similar kind; then comes the Killenaule coal district and the Castlecomer coal district. All these belong to the Coal series, and rest directly upon gray limestone. I refer to them for the purpose of showing that, with the exception of the passage beds at the top of the limestone, the upper shales of Dublin are precisely similar in position, as they are in character, with those coal shales in the south; and the shales in the counties of Kildare, Meath, and Westmeath, coloured on the "Map" as calp, the same.

Those detached patches in Tipperary bear evidence that denudation to a great amount took place over the face of the country, for, being next over the limestone, they are, of course, as just stated, belonging to the very bottom of the coal shales, the upper part having been carried away. In the north of the county of Dublin there is still a good thickness of those shales remaining—I should say, south of the Naul, 1100 or 1200 feet—and ironstones and sandstones, similar to those at Killenaule and Castlecomer accompany them. At Balrickard a gray sandstone was worked for the railway viaduct at Balbriggan. Sandstone occurs at Garristown; to the south-east of Slane is a band, coloured on the "Map" as calp sandstone, and another, similar, near Navan, and many smaller ones, as may be seen by reference to the "Geological Map."

While on this part of the subject I may mention that, when employed on public works in the south of Ireland, I opened dozens of quarries in the coal country about Abbeyfeale, to get sandstone for the bridges and retaining walls. I am well acquainted with their appearance. Some time ago I visited a sandstone quarry near Navan, opened for the use of a railway bridge at Beauparc, and there, at a glance, recognised the lithological character of the quarries at Abbeyfeale: the same in colour, in hardness, in black shale partings, and alternating beds—the same in everything.

For those who may wish to see a clear distinction between those lower and upper shales there is a good opportunity near Malahide. The Carboniferous Slate is seen dipping under the gray limestone, and both in contact at the Martello Tower of Portmarnock, proving it to be the

band below the gray limestone of Dublin, which comes to the surface in many places. From Portmarnock to Malahide, on the sea-shore, is an excellent typical section of this band.

The upper or millstone grit band is seen in the railway cutting near Malahide, at the second viaduct south of the town, adjoining the demesne. About forty yards to the north of this viaduct there is a fault, visible in the cutting, on the north side of which is gray, hard limestone; on the south, black, soft shale (now called Calp), belonging to the coal shales. From the angle of the slope of this fault the geologist will infer that the black rock slipped down from a higher level. Here an instructive comparison may be made between the Carboniferous Slate at Portmarnock Martello Tower and the black shale at the viaduct. The rocks at this break are unconformable, for they dip nearly in opposite directions from the line of fracture. The Carboniferous Slate at the Tower contains beds of crystalline encrinital limestone, amounting in volume to about half the mass. The shale (Calp) at the viaduct has no limestone beds at all—not, I suppose, an ounce in a thousand tons of the mass. The contrast in fossils is this, that out of the 1050 species, exclusive of plants, got in the Carboniferous formations, the Carboniferous Slate contains nearly all the shells and corals found fossil in the limestone; while the shales above contain only from 3 to 4 per cent. of the entire number of the shells, and none at all of the corals.

I have just said that the coal shales contain about 3 or 4 per cent. of the fossils common to the limestone. This makes a pretty large number. I stated before, that there were but very few species common to the two. To explain this apparent discrepancy I will state, that in a ravine at Cahernanalt, two miles north-east of Keadue, in Roscommon, and about 150 feet above a bed of coal, I found a bed of black, calcareous shaly rock, about three feet thick, and in it I got a bag of fossils. These were examined by Mr. M'Coy, and he stated that out of 35 species obtained, 26 were common to the mountain limestone, and 9 either peculiar to the coal shales or new. I would enumerate them here; but my paper is getting long, and I may make them the subject of a future communication to this Society.

While on this point, I will further add, that those fossils found high up in the coal rocks, and the fossils before enumerated, found below in the Old Red Sandstone, which are in both cases common with those of the middle part (the limestone), show two strong links, made by nature, connecting the coal rocks, the limestone, and the Old Red Sandstone with one another into one formation inseparably, and putting them in the position in which they were placed by geologists about the year 1835.

If the rock called Calp of the Dublin district were a band made up of shale and sandstone, between two limestones, as represented in quotation No. 4, the Upper Limestone might be expected to appear in some part of this extensive district overlying the Calp band; but no limestone exists over this peculiar black shale anywhere in Dublin, Meath, or Westmeath. I have no doubt whatever that this whole district, coloured

on the "Map" as calp, is of the Coal series. Every variety of sandstone, ironstone, shale, and fossil to be met with in it is identical with a variety to be seen in some or all of the coal-fields of Leinster, Munster, and Connaught.

The fourth Calp district shown on the "Map" is in the county of Galway. A straight line from Banagher to Monivea would pass nearly through the middle of it. This district occupies nearly 500 square miles. It is, like Dublin, low and flat, and mostly covered with drift. The substratum of the soil is formed mostly of strong clayey gravel, with pebbles of limestone. There is much bog, which lies on similar drift, in this district. Like that near Dublin, there is no section anywhere showing that any limestone overlies the black shale. In Galway it is the same as in Dublin—the base of the Coal series.

The question may naturally be asked here,—Is there any chance of finding coal in Galway? No one can answer this. While the Calp held its sway in the country, this idea could not be entertained; but if this myth should give way, men would begin to think about it. We find in Tipperary, about Fethard and Cashel, detached patches of the base of the coal shales, left on hills or on high grounds, where the limestone attains a good elevation, and it appears that on those high grounds denudation has swept away the greater part of those shales, but not the whole, as the Killenaule coal district, on high ground, still remains to testify. The land of the black shale in Galway is for the greater part in a low position, and now covered over with bog. It may have had more shelter or a greater depth of sea over it at the time the denuding agency was in operation, which would leave it less exposed to the action of that agency than the hills about Cashel, and, therefore, a chance that a considerable thickness of the strata may remain untouched,—thus affording grounds to suppose that coal may be found in Galway, in a low country at least, as well as at Killenaule on a high one.

I have thus noticed the four principal Calp districts, and shown, according to my interpretation, how they ought to be apportioned on the "Geological Map," or at least an approximation to it.

In addition to the objections already urged, it may be stated that there are many clear and satisfactory sections across the whole of the limestone in Ireland, from the Old Red Sandstone at its base to the coal shales above it, in which there is no trace of calp. I shall enumerate a few of the localities where those sections occur.

1. In the county of Clare, on the parallel of Corofin, the Old Red Sandstone occurs on the west side of the Derrybrian mountains; proceeding westwards from those mountains, the limestone is surmounted by the coal shales near Corofin. Here the succession is clear, the dip constant to the west, and the rock visible, indeed quite bare of drift in most part of the section, and there is no calp.

2. A similar section occurs near Ennis, some miles farther south, in which there is no calp.

3. In Limerick, from the Old Red Sandstone at Knockaderry, to the coal shales near Ardagh, there is no calp. In this part there appears

on the "Geological Map" a narrow band of calp; but there is no sandstone in it, which is the main feature of the Calp district at Bundoran, as well as at Slievebeagh. This band vanishes on the "Map" towards Charleville.

4. In Kerry, from the Old Red Sandstone near the Causeway, by Lixnaw, to the coal shales on the south-east, at Crotto, there is no calp.

5. There is no calp near Tralee in the section from the Old Red Sandstone of Slievemish at Ballyseedy, across the limestone to the millstone grit, or rather the coal shales, near Oakpark.

6. In Cork, from the Old Red, at the south-west end of the Galtees, near Buttevant, to the coal shales near Mallow, there is no calp.

7. In Tipperary, in a section from the Old Red at Cahir to the millstone grit near Cashel, none.

8. In Wexford, though the coal shales do not appear at Hook Head, there is reason to believe that the limestone is visible, at least to very near its whole thickness. There is not any calp in the middle of it, that is, if calp consists of black shale and sandstone of the type imagined at Bundoran.

9. At Carlow, as stated by Mr. Griffith, at quotation No. 11, where there is a good section, the calp is wanting. In the Geological Survey, on the "Map" of Carlow, a thin band is shown as calp; but then it must be the black Carlow limestone flags, got a mile from the town, that are turned into calp. This band is one of the varieties of the limestone of which I mean to speak in the latter end of this paper.

10. From the Old Red Sandstone near Mountrath, in the Queen's County, to the coal shales at Ballyroan, there is no calp in the section.

Mr. Griffith himself may remember a time when he considered the shore all the way from Portmarnock to Malahide, in the county of Dublin, to have belonged to his calp. Such was the case when the "Synopsis of the Fossils of the Carboniferous Limestone of Ireland" was written by Mr. M'Coy; and it was a difference of opinion on this point that caused the localities of the fossils to be omitted in the printing of that work. He afterwards became convinced that that opinion was not tenable, and he put the Malahide shore into his Carboniferous Slate. I merely mention this to show that there did not from the beginning appear to be any certain marks by which the calp could be identified. The black shales below of the Carboniferous Slate were frequently confounded with the black shales above the limestone, and the sandstones below, of the Old Red, and the sandstones above, of the Coal series, when found in insulated patches, were often confounded with one another, and all those confounded shales and sandstones got the name of Calp.

Besides the four great Calp districts, there are some smaller ones shown on the "Map" of Ireland; but those are founded on the occurrence of some of the kinds of limestone, than which, perhaps, there is no rock which presents a greater variety of lithological character. In colour it is gray, of every shade, from nearly black to nearly white; it is sometimes quite black; it is blue, red, brown, mottled on a red or brown ground, with

black spots; on a gray ground with large black or white spots, those spots sometimes hard at the edges, and sometimes softened. In grain it is very compact, with a conchoidal fracture. It is arenaceous, siliceous, argillaceous, splintery, crystalline. There are three or four varieties of grain and colour in one quarry at Merlin Park, near Galway.

I was at intervals, for many years, employed by Mr. Griffith at the "Geological Map." The Calp was always a special object of inquiry. About the middle of the limestone close search was made for a little black shale, or a few layers of flint, or a few beds of black or dull earthy limestone, which ought, according to the fixed notion, to be found thereabouts. Any little change of lithological character from the usual light gray type was welcome, and made a foundation for the band of Calp. In this way all the narrow bands were determined upon.

I shall consider one or two of those bands as examples:—say, first, that at the thin end of the great calp wedge already mentioned, a mile south of Drumahaire, in Leitrim. It proceeds from this place and passes immediately to the south of Markree Observatory; then gets very narrow at Killoran church, and continues on to the west of Tobercurry; from this place it turns eastward, by Carrowilkin, to Gorteen, and ends in a pretty broad expanse about Battlefield, to the west of Keshcorran mountain. I believe that in this whole dark-coloured band there is nothing but solid beds of limestone, and they are visible in it where the rock is not covered with drift, which is generally the case. Advantage appears to have been taken of the low situation and the covering of drift to introduce the Calp band along here, to give colour to the theory. The sandstone, which is so thick at Bundoran, is wholly absent, and the representation of the whole band here, fifty miles in length, as it appears on the "Map," is I believe a geological romance.

There is a band of Calp shown surrounding Slievecorran, to the east of Castlebar, which has a ramification to the east of Hollymount, and thence towards Mountbellew Bridge. This is another case founded upon change of lithological character in the limestone. But I need not further particularize those bands. If the Calp be not at Bundoran, as I said before, it is not anywhere, and all those small bands shown upon the "Map" must be swept away.

I have stated that there is a great variation in the lithological character of different parts of the Carboniferous Limestone. In the north of Ireland, about Cookstown and Stewartstown, and in the country on to Clogher, it is, perhaps, not more than from 100 to 200 feet thick. At Blackhead, in the county of Clare, immediately south of Galway Bay, there is a well developed and undisturbed section. Here there is about 1200 feet in thickness of it over water, and some more, buried in Galway Bay, not visible.

The general colour of the mass of the limestone is gray; towards the base it is dark-coloured; towards the top it is of a light-smoke gray. It may be of interest to notice some of the variations of character, and in doing so I shall take them in geographical order, beginning at Dublin, and proceed thence to the north, west, and south.

The county of Dublin is much broken up by faults, and it is impossible to trace the continuity of any band of rock for any considerable distance. One of those faults is visible in the railway cutting at Malahide, between the two bridges next the town. This fault has been already described. A similar fault occurs at Kennon Bridge, near Blanchardstown, in the cutting of the Royal Canal; but I need not enumerate more of them.

1. By means of those faults a certain band of light gray limestone comes to the surface in many detached places. In this the beds are thick and massive, and the stratification obscure. It is at Howth, Raheny, Coolock, St. Doulough's, Portmarnock Church, Carrick Hill, behind Malahide Castle, at Feltrim Hill, Clogran, Cappagh, in the cutting of the Royal Canal near Blanchardstown, at Castleknock, Woodlands, Hermitage, Curkeen, Milverton, Salmon, Oldtown, the Naul, and other places. The country generally between those quarries or hills of pure light gray limestone is covered by black shale, of which, in describing the upper shale connected with the limestone, I have spoken already.

2. Another type is seen in the dark gray and rather argillaceous thick beds, with partings of black shale, on the sea-shore near Malahide and at Swords. This is near the base, and associated with the Carboniferous Slate.

3. The dark gray, compact, close-grained limestone of Aclogh, near Hazelhatch, in Kildare, which is brought to Dublin to be burned, is a third type.

4. The light gray fossiliferous limestone at Millecent, near Sallins, in Kildare. This is much burned for lime in Dublin also. It is remarkable for the abundance of fossils, and particularly of Fenestella, it yields. It might be called the Fenestella limestone.

5. The limestone at Ardbraccan, in the County of Meath; altogether a crystalline gray mass, composed apparently of fragments of Encrinites. This type may be seen in the front of the Royal Dublin Society House, Kildare-street, Dublin, and it appears remarkable when viewed with a magnifier.

6. The red limestone at Castle Espie, near Comber, in the county of Down, is of another type. This band is low down in the Old Red Sandstone, but of course is a band of Carboniferous Limestone, since the Old Red itself in Ireland is a division of the Carboniferous formation; and to back this, the limestone contains some of the peculiar fossils.

7. At Armagh is a mottled marble, with a ground of brownish-red, with dark brown spots softened round the edges.

8. At Armagh there is also a brownish-gray marble, mottled with black spots.

The limestone of Armagh generally is of a yellowish-gray colour, with a tint of pink through it; and this colour prevails also about Cookstown, in Tyrone.

9. In the vicinity of Cookstown there is a peculiarity worthy of notice. The whole of the limestone at this place and on to Dungannon and Clogher, is much thinner than in the South of Ireland, as stated

before. The old red sandstone near Cookstown contains thin bands of limestone, and the gray limestone in the country southwards, contains thin bands of whitish sandstone, as seen at the Rock quarries near Pomeroy, at Donaghrisk, and other places.

10. At Killymeal, near Dungannon, the limestone is of a dull dark gray colour, and argillaceous. The fossil shells it yields are generally of a pure white colour, and very perfect. It is one of the best localities in Ireland for getting Fenestella and other delicately marked corals.

11. At Monaghan the colour of the limestone is of light gray, and it is very siliceous. The Court-house stands on a band of this.

12. At Colooney, near Sligo, is a limestone nearly black; it is very fine-grained, compact, and has a conchoidal fracture. It appears as if it would yield a good hydraulic lime, or give a good polish as a marble.

13. There is a black oolitic limestone at Crosspatrick, near Killala, in Mayo. The old Abbey at Moyne is built of it.

14. There is black marble at Westport.

15. A very light gray oolitic limestone occurs in thin beds at Balla, in Mayo, near the top of the limestone, being covered there by the Coal series of Slievecorran: the thin flags of this limestone give a ringing metallic sound when struck with a hammer.

16. Dark gray marble, nearly black, with a few small white spots, is at Angliham, near Galway. Some slabs are got here with a black ground, having white corals (Syringopora) in radiating lines, which make a very pretty appearance when polished.

17. There is a gray marble at Merlin Park, near Galway, exactly similar to that called the half-moon beds at Raheendoran, near Carlow.

18. There is a light gray oolitic limestone at Toberory, near Tulsk in Roscommon, differing from the gray oolite at Balla in Mayo, in having thicker beds. This oolite contains the usual fossils of the limestone.

19. A grey oolite occurs at Edenderry, in the King's County, which is very massive, and in the quarries assumes a columnar aspect. A similar grey oolite is at Donaghmore, near Rathdowney, Queen's County. It is also at Doon, and at Rushhall, both in the neighbourhood of Borris-in-Ossory; but in those two latter localities it occurs in ordinary beds —the massive columnar appearance is wanting.

20. A light gray, thick-bedded, brittle limestone occurs at Moore, near Ballinasloe in Roscommon, almost composed of a minute coral like Stromatopora, which I think is undescribed. I distinguished this by the name of the Stromatopora limestone, and it occurs in many places in Ireland.

21. A brownish-red marble, mixed with gray spots, occurs at Ballymahon, in Westmeath.

22. At Clonmacnois, King's County, the marble has a gray ground with small white spots, the whole being a mass of Encrinite stems. Marble exactly similar in appearance and colour is got at Palliskenry in Limerick, and at Carrigaline in Cork.

23. At Clonony, near Ferbane, the marble is yellowish-brown, mot-

tled with large gray brecciated spots, and mixed with small gray spots, fragments of Encrinites. Another variety at Clonony has a ground mottled gray and white, with large brecciated brown spots.

24. At Castletown, in Lower Ormond, Tipperary, is a marble mottled red and white; and one something similar occurs at Killarney, in which the red and white occur in stripes. The latter in a cross section resembles a fresh-cut slice of bacon.

25. A gray limestone occurs near Borrisokane in Tipperary, which, when struck, yields a metallic sound. A large piece gives out a deep tone, and a small piece a high note; a musical instrument might be made out of this. A similar limestone occurs in many other places.

26. Light gray limestone, with nodules and layers of chert, occurs near Abbeyleix, Queen's County, and generally round the Coal series of Castlecomer. Of this character are the upper beds of the limestone near the passage into the coal shales almost everywhere they occur along this junction.

27. The black marble near Kilkenny has white marks of fossils, Rhynconella, Cyathophyllum, &c.

28. Another variety at Kilkenny is black, with a few large white crescents. The workmen call this band the half-moon beds. The white crescent is a section of a Productus filled inside with calcareous spar.

29. To the west of the river Barrow, near Bagenalstown, in the railway cutting, there is black shale, interstratified with beds of encrinital crystalline limestone. This type is common near the bottom of the limestone. It is similar on the shore near Malahide; but this type must not be confounded with the passage above from the limestone into the coal rocks (the Calp of Dublin), the black limestone of which has neither crystal nor Encrinite.

30. At Bagenalstown, in the street, the limestone quarried for building is a dolomite nearly black.

31. At Limerick there is very black marble, with a few pure white spots. At Doneraile, a band exactly similar in appearance occurs. Black marble is also got at Tralee.

32. At Palliskenry, in Limerick, there is a reddish-brown marble, with small white spots, remains of Encrinites, in calcareous spar.

33. At Ballymacelligot, near Tralee, a hard, brittle, flinty slate is found, of peculiar type. It is quarried for repairing the roads.

34. At Churchtown, in Cork, the ground of the marble is brownish-red, of various shades, mottled with large, white, brecciated spots, and sprinkled with small ones. Here also is a gray marble, with large white brecciated spots.

35. At Mitchelstown is a marble with a black ground, and large white brecciated spots.

36. At Cork there is a marble having a red ground, with large white spots. Here also is another, mottled gray and white.

37. At Monkstown, near Cork, the marble has a brown ground, mottled with gray and white spots.

Dolomite, a variety of limestone, is only a condition of it induced

by metamorphic action. It can scarcely be ranked among the varieties, for every part of the limestone has been alike affected by it. In the bottom, the calciferous slate on the shore immediately west of the pier at Howth is changed into a dolomitic condition. At the top, the limestone at the summit of Belmore mountain, in Fermanagh, is a Dolomite. The general colour of it is a yellowish-brown, but it varies. At Bagenalstown in Carlow it is quite black. It is extensive about Ballyshannon, in the vicinity of the hill of mica slate, which appears to have been protruded through the limestone there. It is usually found in connexion with, or in the vicinity of, great faults in the strata, and sometimes it is the matter which fills up a dyke. A case of this latter kind is observed on the shore, about a furlong north of the Martello Tower at Portmarnock, in the county of Dublin, where a distinct vertical dyke of this substance is protruded through ordinary limestone strata. Another appears at Dangan, on the shore a mile north of Rush, in this county also.

I have now brought my subject to a conclusion, and will only further say, that to Mr. Griffith we owe much. If another man had been employed in the public capacity that he filled in this country, we probably never would have the "Geological Map" of Ireland now before us; and though it has some faults to be corrected, yet it exists a monument of a great love for his favourite pursuit, joined to a good opportunity of carrying it into effect; and though I differ with him on the subject of this paper, we know that the education of men, and the means by which they attain their knowledge, are so very different that it is impossible they could all think alike.

On the Calp as a geological subdivision, or band of rock, I have not any of the writings of Professor Sedgwick or Sir Henry de la Beche, to quote in corroboration of my views, as I had when treating of the Devonian System, or the Old Red Sandstone of Herefordshire. The Calp has been written upon only by Mr. Griffith, and no views but his are yet published on the subject. There are, however, a few sentences in Professor Sedgwick's Introduction, already mentioned, which are so applicable to the present case that I shall quote them. He says:—

"In the progress of a rapidly advancing science, a great and good workman may make a great mistake; and if that mistake be largely adopted under the sanction of his name, so much the worse for himself. A bold generalization, ratified by a technical name, may have the promise of some endurance; for men hate to be dangling in doubt, and one who offers to the inquiring mind an apparent resting-place is sure of immediate favour. When a man has accepted a technical name, he never readily submits to the humiliation of parting with it; and he will often cling to names with more tenacity than he clings to principles, which he never, perhaps, examined for himself, or, it may be, never thoroughly comprehended.

"The truths of nature, however, are not things mutable, and dependent on popular voice; they are eternal. Physical mistakes, whether of classification and nomenclature, or of a false induction from facts im-

perfectly observed, may last their day, but that day cannot be long while the spirit of inquiry is alive among mankind, and they are awake to the power and sanctity of philosophic truth.

"The higher the authority from which an error is promulgated, the greater is the danger to science. If I differ from a fellow-labourer, the greatest respect I can pay him is to tell him, plainly and honestly, where I differ from him, and it is no mark of respect to merge plain truth in mealy-mouthed words of stupid and unmeaning courtesy."

With these views, though I undertook the task of writing this paper with reluctance, I thought it a duty to put forward the views I entertain on the subject of it; to record the convictions resulting from an amount of experience that falls to the lot of few; and to try to get corrected what I believe to be an error, by laying before this Society my reasons for that belief.

EXPLANATION OF PLATE V.

Fig. 1. *a*, a strong conglomerate at Sybil Head, about 60 feet thick; the base of the Carboniferous formation dipping N. W. 60° into the Atlantic, and lying unconformably on the ends of the brownstone strata from *a* to *b*.

g, *m*, *n*, *h*, *i*, supposed the original surface of the land.

m, *n*, *o*, *p*, a fossiliferous band of rock.

h, *k*, a supposed line of fault or slip.

c, *k*, a greenstone protrusion at Clogher Head.

b, *k*, the white part a fossiliferous band at Ferriter's Cove, supposed to have slipped down from the position *m*, *n*, on the line *h*, *k*, and to be the equivalent of *c*, *p*, *o*, *d*: a similar fossiliferous band at Doonquin Old Church; each band a part of the original *m*, *p*, *o*, *n*. See pp. 15, 16.

At *d* the lithograph is defective: the white between *d* and the line *n*, *o* should be shown as grit and slate, the same as between *d* and *e*.

Fig. 2. A, B, represents the Old Red Sandstone conglomerate; over it is the Old Red Sandstone, shown as dotted; next the Limestone, white; and lastly, the Coal Rocks, shaded with close horizontal lines.

a, Granite.
b, Stratified quartz rock.
c, Mica slate.
d, Primary crystalline limestone.
e, Greenstone.
f, Amorphous quartz rock.
g, Gray clay slate.
h, Gray grit.
i, Red clay slate.
k, Green grit.
l, Green chloritic slate.
m, Brownstone.

This plate is illustrative of a paper entitled "Researches among the Paleozoic Rocks of Ireland," by Mr. Kelly, for which see "Natural History Review," vol. iii., p. 115.

EXPLANATION OF PLATE VI.

Fig. 1. Sketch on the shore at Bundoran, at low water: *b*, *c*, *d*, a ravine; *c*, *e*, a vertical fault, having the dotted part *d*, Old Red Sandstone, on one side of it; the shaded part *b*, Carboniferous Slate, with fossils, on the other.

Fig. 2. Sketch of section at Kildoney, near Ballyshannon: the dotted part Old Red Sandstone, the other part limestone; *b*, *d*, a vertical fault between them, which brings the two rocks into juxtaposition at the surface.

Fig. 3. Sketch of section on the shore at Cultra, four miles N. E. of Belfast: from *a* to *b* red sandstone; from *b* to *c* gray and black shale, containing scales of Holoptychius and Paleoniscus, with Modiola, and others; *c*, *d*, red sandstone; *d*, *e*, yellow magnesian limestone; *e*, *f*, red sandstone; *f*, *g*, thin beds of bluish-gray limestone and red sandstone alternating; *g*, *h*, red sandstone. At *c*, *d*, *e*, *f*, *g*, whin dykes, generally vertical.

Fig. 4. Sketch section from Shean Hill, on the south, across a part of Lough Erne to Portinode, on the north: A, *a*, bands of millstone grit on the different sides of the fault *e*, *f*, and geological equivalents; B, *b*, limestone groups, and equivalents also; C, *c*, Carboniferous Slate, same; D, *d*, Old Red Sandstone, same; *g*, a talus of *debris* at base of cliff adjoining the fault; *h*, a part of Lough Erne.

Fig. 5. Sketch section near Bundoran, looking N. W.: *a*, band of millstone grit; *b*, limestone in Dartry mountain; *c*, Carboniferous slate, which lies in conformable succession on *d*, the upper part of the Old Red Sandstone, which here, as in most other places, is yellowish; *e*, Carboniferous Slate, separated from *d* by a fault; *f*, limestone at Finner Point, the junction with *e*, not clear, being covered with sand.

Fig. 6. Sketch section through the Slievebeagh mountains, from Monagh to near Clogher, looking westward: *a*, *b*, sandstones and shales of the Coal series alternating; *c*, Carboniferous Limestone; *d*, Carboniferous Slate; *e*, Old Red Sandstone; *f*, Graywacke, or gray clay-slate and grit alternating; *g*, brown grit, with red and purple shales alternating, the grits resembling those near Ferriter's Cove, Dingle.

WEDNESDAY EVENING, APRIL 8, 1857.

D. M'Causland, Esq., in the Chair.

Mr. R. Griffiths read the following—

NOTES EXPLANATORY OF THE SUBDIVISIONS OF THE CARBONIFEROUS SYSTEM, AS LAID DOWN ON HIS LARGE "GEOLOGICAL MAP OF IRELAND," AND EXEMPLIFIED IN THE SECTIONS ENGRAVED ON THE MARGIN OF THAT MAP, AS ALSO IN OTHERS EXHIBITED AT SEVERAL MEETINGS OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, DURING THE LAST TWENTY YEARS.

In the infancy of the science of Geology geologists were in the habit of grouping rocks which presented some character or characters which were common to all the members of a general system. Thus my lamented friend, Greenough, in the first edition of his "Geological Map of England," coloured the entire Carboniferous System of England with a light shade of black; but as careful and minute observation extended, he found it necessary to subdivide the system into four members, namely, Lower Limestone, Upper Limestone, Millstone Grit, and Coal.

A similar process gradually took place in the colouring of my "Geological Map of Ireland," the first outline of which was exhibited by me in the year 1813; and these gradual changes have not been confined to the Carboniferous, but extended gradually to the older sedimentary as well as the igneous rocks, each being introduced so as to correspond with the development of geological science, much exertion having been made by me to keep pace with modern discoveries and views, and with subdivisions based as well on stratigraphical as on palæontological data; and although in some localities the accuracy of the lines of division adopted by me, particularly those between the Old Red Sandstone and the Yellow Sandstone in the north, and between the Silurian and the Old Red Sandstone in the counties of Cork and Kerry, may be liable to further consideration, and perhaps may still admit of modifications in doubtful cases, I have yet the satisfaction of believing that the last edition of my "Geological Map" corresponds with the views generally entertained by our most accomplished and experienced practical geologists.

This short history of my geological proceedings is made at the present time in consequence of the paper read by Mr. John Kelly at the meetings of the Society for the months of January and March, in which he endeavours to impugn the accuracy of the subdivision of the Carboniferous System of Ireland which has been adopted by me for upwards of twenty years.

Previously to that period, in conformity with the principle adopted by Mr. Greenough and others, the Carboniferous System of Ireland was represented on my "Geological Map" by two colours,—blue and black,—the first representing the limestone, and the black the Coal series; but during the progress of my geological observations, made as opportunity offered in every part of the country, I found that, although my original

views were correct in the gross, they were liable to objection in detail, inasmuch as many localities, represented by the blue colour as limestone, rarely contained any calcareous rocks sufficiently pure to produce caustic lime when burned, which is the agricultural test of limestone; and, as several landed proprietors complained of my want of accuracy in this respect, I determined to subdivide the System, so as to distinguish the shales and sandstones where each occur; and I have in consequence introduced the Yellow Sandstone and Carboniferous Slate, forming the lowest members of the series, and the Calp, which is interposed between the Lower and Upper Limestone.

In the paper just alluded to Mr. Kelly gives it as his opinion, that the Carboniferous Limestone of Ireland consists of one uninterrupted accumulation of limestone beds, interposed between the Carboniferous Slate at the base and the Millstone Grit at the top, and that my subdivisions of the Limestone series into three, viz., the Upper and Lower Limestone, with an intermediate series, consisting of dark-gray shale, impure limestone, and occasionally sandstone, called Calp, is erroneous; and that no such middle term exists in Ireland or elsewhere. This is a bold assertion; but by reference to plans and sections, carefully made, I have no doubt of being able to prove that Mr. Kelly is in error, and that my views, as shown in the last edition of my large "Geological Map of Ireland," are correct.

This triple division of the Carboniferous Limestone was first published by me at the meeting of the British Association for the Advancement of Science, held at Liverpool, in the year 1837; and an abstract of my paper on the subject is contained in the proceedings of the Geological Section C, page 88, of that year, to which I beg to refer. I have fortunately preserved the section exhibited at the meeting, which shows the grounds on which my subdivisions of the Carboniferous System, as regards Ireland, were based.

This section exhibits the geological structure of the Carboniferous System for a distance of fifty miles, in an east and west direction, commencing in the Silurian strata near Butler's Bridge, in the county of Cavan, and extending westward by Belturbet to Slieve Rushen mountain, crossing Cuilcagh mountain, the valley of the Shannon, Lackagh, and Benbo mountains, and terminating on the sea-shore at the western base of Benbulben mountain.

In the neighbourhood of Butler's Bridge the Silurian strata are covered unconformably by strata of yellow sandstone, which are succeeded by a band of Carboniferous Slate, and afterwards by the Lower Limestone, which near Drummany Lough, two miles west of Belturbet, is succeeded by alternating beds of shale and impure limestone of the Calp series, together with gray and occasionally reddish sandstone. These strata extend westward from Drummany Lough, by Ballyconnell, to the base of Slieve Rushen, for a distance of about four miles, where they are succeeded by the gray splintery limestone (Upper Limestone) of Slieve Rushen, which in this locality is upwards of 400 feet in thickness. This limestone is capped on the summit of the mountain by sandstone belonging

to the Millstone Grit series; descending to the westward, we lose the Millstone Grit, and the Upper Limestone appears again at the surface in the line of section; and further west we find the calp and shale cropping out from beneath it, and forming the valley of Swanlinbar, which is altogether composed of the Calp series; from whence it extends northward to Florence-court, where it terminates, and the subjacent Lower Limestone commences, and continues to Enniskillen. In a south-western direction from Swanlinbar the Calp extends to Ballinamore, in the county of Leitrim, where we again find the Lower Limestone cropping out from beneath it.

Here let us pause to consider the result of what has been shown. We find that to the east of Slieve Rushen the Calp series rests on the Lower Limestone at Drummany, and is covered by the Upper Limestone at Ballyconnell; again, in a north and south direction, at right angles to the section, we find that the Lower Limestone, extending southward from Enniskillen, is covered by calp and shale near Florence-court, from whence it continues, in a southward direction, to Ballinamore, where it rests on the Lower Limestone of the valley of Leitrim. In fact, the Upper Limestone of Slieve Rushen is entirely surrounded by the Calp series, which is itself surrounded by subjacent Lower Limestone, for a circumference of thirty-six miles: and thus in this case we have a succession of concentric circles, each surrounding the other, in an ascending order from the Lower Limestone by the Calp to the Upper Limestone, proving the triple subdivision of the Carboniferous Limestone System, as originally described by me, to be correct; and consequently Mr. Kelly's view that the Carboniferous Limestone of Ireland consists of one undivided series, based as it is on the occurrence of supposed faults, is erroneous and untenable. Continuing the section westward, the Calp of the valley of Swanlinbar is succeeded by the Upper Limestone of Cuilcagh mountain, which, as at Slieve Rushen, is capped by the Millstone Grit; and, still proceeding westward, the same series crosses the valley of Lough Allen by the source of the Shannon, and thence by Lugnaquilla and Lackagh mountains, each of which contains a bed of coal near the summit. To the west of Lackagh mountain the Upper Limestone crops out from beneath the Millstone Grit, and descends into the valley of Manorhamilton, where the Calp series is again well exposed, as well as a portion of the Lower Limestone, the remainder having been cut off by the protrusion of the granite ridge of Benbo mountain, but which, in continuation in a south-western direction, extends to Collooney, &c., in the county of Sligo, where it is fully developed.

To the westward of the Benbo ridge we have again the Upper Limestone, and beneath it, in the remarkable valley of Glencar, there is a fine exhibition of the calp and calp shale, which on the west side is again succeeded by the Upper (or splintery) Limestone of Benbulben. This rock forms the upper portion of this lofty mountain, the table summit of which is characteristic of the district.

Descending westward from Benbulben, we find the strata beneath the Upper Limestone to consist—first, of a series of beds of calp and shale,

800 feet in thickness, under which, for the first time in this line of section, we have a considerable development of gray sandstone, which in this locality extends down to the sea-shore, and beneath which, to the northward, there is a considerable thickness of beds, consisting of alternations of calp and shale, similar to those which lie above it. These strata are well exposed to view on the west coast of the counties of Sligo and Leitrim, extending northward for upwards of sixteen miles from Glencar, by Benbulben, to Dartree mountain, near Bundoran; thence for fifteen miles, in an eastern direction, by Garrison and Belleek, to Lower Lough Erne, and afterwards in a southern direction, for fourteen miles, from Churchill, by Derrygonnelly and Belmore mountain, to the Arney river, near Florence-court, where it gradually thins out. And thus we have a total length of thirty-five miles, in a northern, eastern, and southern direction, in which these remarkable sandstone and shale beds are fully exposed for examination to the geological observer.

In the line of section engraved on the western margin of the "Geological Map," which passes over the summit of Dartree mountain, at an elevation of 1712 feet above the level of the sea, and which extends northward to Ballyshannon, &c., we find that the Upper or splintery Limestone gives a thickness of 500 feet; the Upper Calp Shale beneath it, 500 feet; the subjacent sandstone beds, 800 feet; the Lower Calp Shale, 500 feet; and the Lower Limestone, extending northward from Bundoran to Ballyshannon, 600 feet, making a total thickness in this locality of 2900 feet, of which 1800 feet belong to the Calp series. But this is an unusual development, as in other cases the thickness does not exceed half that amount, the variation in this respect being caused by the gradual thinning out of one or more of the members, particularly of the sandstone, which at the opening of Glencar, at the southern base of Benbulben, commences in the form of a wedge, having shale and impure limestone beds both above and below, and gradually thickens as it extends northward; and a similar occurrence takes place near the southern termination of the Arney River. Thus the eastern escarpment of Glenkeel mountain, south of Derrygonnelly, and ten miles north of the Arney River, gives nearly a similar section to that of Dartree mountain, presenting the Upper Limestone, the Upper Calp, the Sandstone beds, the Lower Calp, and subjacent Lower Limestone at Ely Lodge, on Lough Erne. Here the Sandstone beds are of considerable thickness; but to the southward they gradually diminish, and, after passing the Arney River are no longer visible, having thinned out, as at Glencar, and are lost in the union of the Upper and Lower Calp series; and these united beds continue thence through Florence-court to the valley of Swanlinbar, in which no beds of sandstone have been observed.

The variable thickness of the sandstone beds and their general fugitive character are familiar to geological observers; but the facts here related afford a remarkable example.

On the margin of the last edition of my large "Geological Map of Ireland" I have given a section which exhibits the entire suite of the Carboniferous System of Ireland, and which passes through the larger

portion of the same district, but nearly at right angles to that exhibited at Liverpool, which I have just described. This section was exhibited at the meeting of the British Association held at Manchester in the year 1842, and it clearly shows the relative positions of the different members of the series; and it is the accuracy of this section which is endeavoured to be impugned by Mr. John Kelly, who conceives that the shales and sandstones, as there represented by me as belonging to the Calp series, really belong to the Old Red Sandstone, and the equivocal position in which the strata occur is accounted for by him by a great east and west fault, extending from the north-west end of Lough Erne to the sea-coast south of Bundoran, in the county of Donegal. But there are no grounds for this supposition. No doubt there is a fault, of trifling character, having a *north and south* direction, visible near the coast south of Bundoran; but in this case the strata, on both sides, belong to the same Calp series, as described by me, while its north and south direction contributes nothing towards sustaining Mr. Kelly's assumption of the great fault extending westward from Lough Erne to the sea-coast near Bundoran; and the only argument he has brought forward in support of his opinion is, that the level of the millstone grit at Shean Hill, on the south side of Lough Erne, is 1135 feet above the sea, while the millstone grit on the north shore of Lough Erne is only 150 feet above the sea; and, arguing on this difference of 985 feet, he assumes that a downthrow of about 1000 feet has taken place between the north and south shores of Lower Lough Erne. But Mr. Kelly's basis for the argument has no foundation, because the strata on the north shore of Lough Erne consist of yellow sandstone, and not of millstone grit. If Mr. Kelly has not himself examined this district with a view of ascertaining whether his fabric of faults was well founded, and if, in default of his own observations, he depended on published data supplied by me, he should have referred to the latest edition of my "Geological Map," or, indeed, to any publication of that document, even to the comparatively imperfect small one first published in the "Atlas" attached to the "Irish Railway Commissioners' Report," in which the country forming the north shore of Lower Lough Erne is represented as belonging to the Carboniferous Limestone series, and not to the millstone grit. No doubt in the printed geological "Outline" itself, owing to a want of accurate information at the time, and basing the supposition on the occurrence of a thin bed of coal, it is mentioned that a millstone grit district extended from Drumquin "*towards*" Lough Erne; but no just conclusion can be drawn that the expression "*towards* Lough Erne" has the signification of the expression "*to* Lough Erne;" and had Mr. Kelly examined any of my *published* Maps, he could not have fallen into error in this respect. But I must confess that it appears to me to be unusual as well as unaccountable that the data used by Mr. Kelly, in his endeavour to overthrow the system of geological classification adopted by me, should have been derived, not from any of my more recent publications, but from a hasty "Outline," written nearly twenty years ago. Should he not in such case have inves-

tigated in the field the grounds on which his theory of gigantic faults is based?

I will now refer to a paper read by me at the meeting of the British Association held at Cork in the year 1843, in which I described in detail the strata which occur on the north shore of Lower Lough Erne, extending in an eastern direction, an abstract of which will be found in the "Proceedings" of that year, Section C, page 42, from which I may quote the following:—

"Mr. Griffith next described the district situated to the north-east of Lough Erne, which contains a great variety of strata, belonging to the Carboniferous, the Silurian, and the Mica Schist Systems. The succession of the strata as they occur in this interesting district was exhibited in two sections, one of which extended from the Mica Schist District of the county of Donegal, north of Pettigo, across the limestone and sandstone valley of Pettigo, Kesh, and Ederney; it afterwards traverses the brownish-red conglomerate and sandstone district of Lisnarick and Irvinestown, and, in continuation, the dark-gray slate district of Lisbellaw, which contains Silurian fossils; from whence it is continued across the limestone valley of Brookborough, thence over the Slievebeagh mountains, and terminates in the graywacke slate district of the county of Monaghan,—thus exhibiting the structure of the country for a length of forty-two miles.

"Commencing at the northern extremity of this, the most southerly of these sections,—that near Pettigo,—we find the mica schist covered in an unconformable position by a bed of red conglomerate, about fifty feet in thickness, which is succeeded by beds of yellow sandstone, alternating with dark-gray shale, and occasional beds of dolomitic limestone. The shale contains the casts of plants, and also in abundance *Modiola Macadami*. These strata are about 150 feet in thickness. Above we have alternations of dark gray shale with occasional beds of gray sandstone, and a few beds of calcareous clay ironstone, sixty feet thick. This mass of shale and sandstone is succeeded by a series of beds of blue limestone, occasionally alternating with dark gray shale and yellowish-gray sandstone, 500 feet in thickness. It is remarkable that a thin bed of coal, half an inch thick, is included between two of the limestone beds at the base of this division. The limestone is frequently dolomitic, and, as is usual in such cases, fossils are of rare occurrence. Above we have a succession of beds, consisting of alternations of limestone and dolomite, about 100 feet in thickness, followed by alternations of dark gray, impure limestone, and black and gray shale, 300 feet thick, on the top of which we have beds of gray siliceous limestone, about sixty feet in thickness. These calcareous strata are succeeded by a great accumulation of beds, consisting of gray sandstone and shale; in some places the sandstone, and in others the shale, predominates, the whole being interspersed with occasional beds of impure limestone, amounting altogether to a thickness of about 700 feet. The shale contains in abundance *Modiola Macadami*, and the usual fossils belonging to the shale beds.

"These strata are followed by others very similar in character, excepting that the sandstone rather predominates. In the lands of Formil, close to the village of Tubbermore, a bed of highly carbonaceous shale, with two inches of bituminous coal, occurs in the sandstone. The shales produce the same Modiolas, Pectens, &c., as those lower in the series; but on the lands of Drumcurren, on the left bank of the river Banagh, numerous casts of the scales of *Holoptychius Portlockii*, accompanied by a single specimen of Pœcilodus, occur; also plants identical with those of Kilcummin Head, particularly the *Sphenopteris linearis*, and a small-leaved plant, apparently a fucoid.

Above the fish-scales, and approaching the great or Lower Limestone, the shales were found to contain fossils indicative of the Carboniferous Slate; but owing to the unusual abundance of sandstone which accompanies the shale, it is difficult in this locality to draw with certainty the line of separation between the Carboniferous Slate, or Lower Limestone shale, and the Yellow Sandstone. The thickness of this upper portion of the series may be about 1200 feet: thus making the whole series, including the Yellow Sandstone and Carboniferous Slate, about 2900 feet in thickness. To the east of the village of Kesh and Ederny, Carboniferous Slate is succeeded by the Lower Limestone, the thickness being about 700 feet, and this again by the calp shale and calp sandstone."

I shall not dwell longer on this part of the subject, further than to state, that in no part of Ireland is the entire suite of the Carboniferous system so well or so clearly developed as in the formation surrounding the Connaught millstone grit district, situated in the counties of Leitrim, Roscommon, Sligo, and Fermanagh; and, as a convincing proof of the accuracy of my section through this district, as shown in the section engraved in the margin of my "Geological Map," I shall now exhibit a section on a larger scale, carefully made, in which the succession is perfect, and where the actual contacts have been carefully observed, and in which line no important fault has been discovered, nor can such exist. This section, in fact, forms a portion, though it has not been taken in the precise line, of that engraved on the margin of the "Map." Commencing in the Millstone Grit series of Dartree mountain, it extends, in a north-western direction, to the metamorphic Mica Schist, situate to the east of Ballyshannon, and in continuation still in a north-western direction; leaving the Mica Schist, the section crosses the Lower Limestone, which is again succeeded by the lower calp shale, which in this case, as at the base of Dartree mountain, is followed by the calp sandstone of Kilbarron, the contacts of the different series of rocks having been in each case accurately observed.

Mr. Kelly in his paper describes the Slievebeagh mountains, which occupy the northern portion of the county of Monaghan, and south of the county of Tyrone, as belonging to the Millstone Grit series, in consequence of the strata resting on limestone, and consisting at the base of alternations of impure limestone, succeeded by beds of sandstone; and he supports his view by the statement that the strike of this mountain ridge is parallel to the strike of the Coal series of the west of Scotland;

but he appears never to have reflected that the Lower Limestone, which supports his supposed millstone grit to the south of Lisnaskea, in the county of Fermanagh, also supports similar strata to the west of Lough Erne, which, as already mentioned, are succeeded by the Upper Limestone and the Millstone Grit of Slieve Rushen mountain,—the breadth of the subjacent Lower Limestone between the calp of Lisnaskea and that at the base of Slieve Rushen being but three miles, as may be seen by reference to the "Geological Map." But I feel certain that no geologist, who has examined the country, will agree with Mr. John Kelly in regard to the geological position of the Slievebeagh mountains, but will decide with me that it is rightly referred to the Calp series.

I shall now exhibit a section extending, in a south-eastern direction, from the Silurian strata at Lisbellaw, in the county of Fermanagh, across the Lower Limestone valley of Clogher, thence over the Slievebeagh mountains, which, in continuation, crossing the Lower Limestone valley of Monaghan, terminates in the Silurian strata of Scot's-house, west of the town of Monaghan.

This section, in fact, forms the continuation of the section already described at the meeting of the British Association held at Cork in the year 1842; and I shall quote from the abstract of my paper which refers to the Slievebeagh section:—

"At Lisbellaw the Silurian rocks are succeeded unconformably by strata belonging to the Yellow Sandstone series, which is here very imperfectly developed, owing probably to its being cut through by the projection through it of the Silurian series. The Yellow Sandstone is followed by the Carboniferous Slate, and this again by the Lower Limestone, and, in continuation, by the calp and calp sandstone of the Slievebeagh mountains, from beneath which, in an eastern direction, we find the Lower Limestone and Carboniferous Slate appearing at the surface in the valley of Monaghan, and terminating unconformably on the graywacke slate, which bounds that valley to the south-east."

I shall not enter into any description in regard to the several other Calp districts laid down in my "Geological Map," as I know that the greater number of them have been examined by several distinguished geologists belonging to our Society; and I shall leave it in their hands to decide between Mr. Kelly and myself. But as I am not aware that any of them have as yet had an opportunity of examining in any detail the Carboniferous System of the counties of Donegal, Cavan, Fermanagh, Leitrim, Sligo, and Roscommon, I thought it desirable to make this short communication in reference to that district.

I shall only further remark, in regard to the Carboniferous System of the south of Ireland, where the Calp is frequently wanting, that it is well developed in the county of Limerick, along the eastern boundary of the great Millstone Grit district of Munster, and I have prepared a section of the series, extending from the Old Red Sandstone of Pallaskenry, on the south side of the river Shannon, in a western direction, to the anthracite beds south of Loughill, in which the entire suite of rocks into which I have subdivided the Carboniferous System are clearly exhibited, namely,

the Yellow Sandstone resting conformably on the Old Red Sandstone, the Carboniferous Slate, or Lower Limestone shale, the Lower Limestone, the Calp, and the Upper Limestone, the last being again succeeded by the Millstone Grit, which in this locality contains thin beds of anthracite; and I may mention, that in this section the Calp series consists, as usual, of alternations of blackish-gray, impure siliceo-argillaceous limestone, and dark gray shale, the thickness being about 800 feet.

For the Sections referred to in this Paper *vide* Plate VII.

NOTES ON THE CALP OF KILKENNY AND LIMERICK. BY J. BEETE JUKES, M. A., F. R. S.

My friend, Mr. Kelly, having in his paper lately read before this Society thrown some doubts on the existence of the group of rocks known as the Calp, which occupies a conspicuous place in Mr. Griffith's Map, and is shown as a distinct division on the lately published Maps of the Geological Survey,—I feel compelled to offer a few observations respecting it. I do this the more readily as Mr. Kelly endeavoured to prove that what was called Calp was in reality Coal-measures,—an assertion which would have such mischievous practical consequences that it is necessary its error should be immediately pointed out.

The lower part of the great Carboniferous formation has several different types in different parts of the British Islands. In Ireland these different types are three, that, namely, of the south, that of the north, and that of the centre. In the extreme south, namely, in Waterford, Cork, and Kerry, the Carboniferous Limestone forms one group, having underneath it a set of rocks which have two very different types in two different districts, and over it a set of dark shales and olive-coloured sandstones, containing some thin beds of coal, and therefore called Coal-measures. In coming towards the north, namely, into Limerick on the one side, and Kilkenny on the other, it becomes possible to subdivide this single group of Carboniferous Limestone into three sub-groups, lower, middle, and upper,—the middle receiving the provincial term of Calp.

The sole invariable distinction on which this subdivision rests is one of colour,—the Calp in the districts above named being invariably dark-coloured, generally nearly or quite black; while the upper and lower limestones are commonly gray, sometimes dark gray, sometimes nearly white. This Calp, then, is a mere local subdivision depending on lithological distinctions, and is not to be looked at as a geological formation, the equivalents of which are to be sought in other localities, or to be determined by separate suites of fossils. Its dark colour seems to be the result chiefly of earthy, more or less carbonaceous, matter being mingled with the limestone, sometimes in such proportion as to preponderate over the calcareous matter, so much that the stone would be no longer fit for burning into lime; sometimes to such an extent as to become mere shale, and beds of dark shale are generally found in greater or less thickness alternating with the limestones throughout the Calp districts of Kilkenny and Limerick.

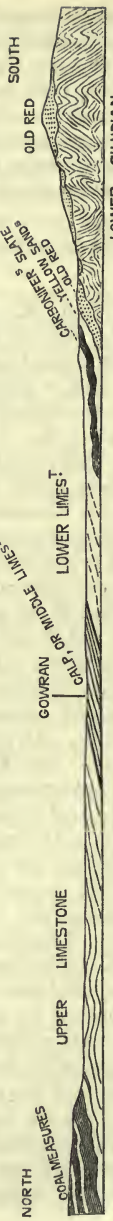
The occurrence of so much earthy sediment in the old seas, of course, was unfavourable to the life of the clear-sea-living animals, whose remains are found in the pure limestones; while other creatures who preferred a muddy sea, such as Posidonia, &c., inhabited it instead. Generally, however, the Calp is poor in fossils, though locally they do occur; and where the Calp is merely a dark limestone, I am not aware of its having any essential palæontological peculiarities—except paucity of fossils—different from those of the upper and lower limestones.

In the second Part of the sixth volume of our Journal, my former colleague, Mr. Andrew Wyley, has described the constitution of the Carboniferous formation of Kilkenny so accurately and well as to render it unnecessary for me to go over the same ground. I have only to say, that the one-inch maps of the district are now published, and to be had at Messrs. Hodges and Smith's; and to point to those on the wall, as presented to this Society by Sir R. I. Murchison on the part of her Majesty's Government; and also to the section through Gowran, which Mr. Du Noyer has constructed for me, from the six-inch data maps preserved in our office, in support of Mr. Wyley's conclusions. This section, however, would induce me to diminish the thickness assigned to the groups by Mr. Wyley, and to give the following as more probable:—

	Feet.
7. Coal-measures, . . upwards of	1000
6. Upper Limestone, ...	1000
5. Middle (or Calp) Limestone, . .	600
4. Lower Limestone, ...	1000
3. Lower Limestone Shale, or Carboniferous Slate, ...	150
2. Upper Old Red Sandstone, or Yellow Sandstone, ...	250
1. Lower Old Red Sandstone, . . .	300
Total thickness, ...	4300

This thickness is one-third less than that given by Mr. Wyley in Nos. 4, 5, and 6, and two-thirds less in No. 3. As groups 1 and 2 are evidently thinning out towards the north, it is possible that group 3 is thinner in the above section than it is further south, where Mr. Wyley took his data from.

About eighty miles due west of Gowran is the village of Foynes, on the south bank of the Shannon, and



Section No. 1.

Horizontal Scale, 1 m. = ¾ in. Vertical Scale, 1 m. = 1½ in.

in that neighbourhood the constitution of the Carboniferous formation is very similar to that of Kilkenny. The district is now being surveyed by Mr. G. H. Kinahan, and, although not yet complete, yet from an inspection of his work last week, and going over the ground together, we arrived at the following conclusions:—

The Carboniferous formation on the south side of the Shannon, between Pallaskenry and Foynes, is composed as follows:—

	Feet.
6. Coal-measures, ... upwards of	1000
5. Upper Limestone, ...	250
4. Middle dark Limestone and Shale (Calp), . . .	1400
3. Lower Limestone, gray, ...	1500
2. Lower Limestone Shale (Carboniferous Slate), . .	350
1. Yellow Sandstone, ...	100
Total thickness, ...	4600

1. Base not seen; yellowish grits and sandstones; sometimes calciferous, with a few reddish beds below: ascending, they alternate with beds of dark shale and compact limestone. Fossils, plant stems and fragments, Encrinite stems, *Modiola Macadami*, and other bivalves.

2. Black shales, sometimes calciferous, passing up into alternations of shale and argillaceous limestone; flaggy, and often nodular and concretionary. Fossils, fucoid beds, Michelinia and other corals, Encrinites, Fenestella, annelid tracks, Pecten, Spirifer, Producta, &c.

3. Lower Limestone.—Massive light-gray limestone, with, both at top and bottom, a purple band having red shale partings. The limestone much jointed; stratification often obliterated; bands of grey chert at base of group. Fossils very abundant; beautiful cephalopodous and other univalves in upper portions.

4. Calp Limestone.—Dark blue, sometimes black, compact limestone, with partings of dark shale, and thick beds of dark gray shale in lower portion; chert abundant throughout; bands and nodules of white chert at base; bands of black chert in other portions. Fossils, a few Productæ and Spirifers; Encrinite stems abundant in patches, occasionally Euomphalus, &c.

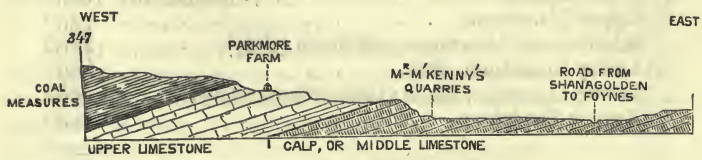
5. Upper Limestone.—Thin, flaggy, light-coloured limestones, nodular, and full of concretions of gray chert, on which rest a few very thick beds of massive pale-gray limestone, capped by thinner beds, which, near the top, are separated by seams of black shale, sometimes sandy, the limestones themselves becoming darker in colour. Fossils, Encrinites very abundant; Productæ, Spirifers, and some univalves.

6. Coal-measures.—Black indurated shale, passing up into alternations of dark shale with brown and olive-green fine-grained grits, the shale sometimes becoming purple. Fossils, *Pecten papyraceus*, Goniatites, &c., with coal plants higher up.

In one locality—townland of Lisgordan, N. of Cahermoyle—we

procured beautiful seams of Wavellite in the shales near the base of No. 6.

Near Limerick, the beds of No. 4 greatly resemble those about Dublin ordinarily known as Calp. Towards the west these seem to become more purely calcareous, as they probably do also towards the south, so that, eventually, their distinctive characters become obliterated. Between Shanagolden and Foynes they may be distinctly seen to pass under the comparatively thin group of the upper Limestone, as in section No. 2.



Section No. 2.

Scale, vertical and horizontal, = 6 in. : 1 mile.

The thinning out of the Upper Limestone on the west side of the county of Limerick is very instructive, as suggesting the possibility of its thinning out altogether in some localities. Possibly this may be the true interpretation of the great thickness of the Calp of Dublin. It may be, that all the upper portion of the Carboniferous Limestone here assumes the Calp character, and that the Coal-measure shales would rest upon the Calp of the central counties of Ireland, without the intervention of any upper Limestone; or the upper Limestone may come in its true character, as a light-gray fossiliferous limestone, only in local patches, as suggested in the County or Index Geological Map of the county of Dublin.

DUBLIN NATURAL HISTORY SOCIETY.

FRIDAY, APRIL 3, 1857,

PROFESSOR W. H. HARVEY, M.D., M.R.I.A., F.L.S., President, in the Chair.

THE Minutes of the previous Meeting having been read and signed,—

The PRESIDENT rose, and made the following remarks—

WE had been summoned to meet to-night, a week in advance of our usual time, in consequence of the second Friday of the month falling on Good Friday; but instead of proceeding with the essays of the evening it becomes my unexpected and painful duty—in compliance with the unanimous wish of your Council—to move that this meeting adjourn to

Friday, the 17th instant. The cause need scarcely be stated, so general throughout Dublin has been the shock felt at the sudden decease of Dr. Robert Ball, Director of the University Museum, and President of a Society kindred to our own. Of my private feelings on this occasion I will not speak. Every one knows how intimately we have been connected together for a very long time. Our friendship commenced two and thirty years ago, when I was a schoolboy, and closes, leaving me a gray-haired man; and throughout the whole of that period we have had neither quarrel, nor jealousy, nor severance of feeling any kind. I always found him the same—full of zoological information, most ready to impart it, and taking special pleasure in seeing other students of nature entering the field which he had so well trodden. I well remember how proud I was, as a boy, to find myself on terms of intimacy with a grown man who was so fully informed on the subjects which were mysteries to me. My favourite pursuit at that time was the Mollusca (I had not then commenced Botany), and during a summer spent at Youghal I profited largely from Dr. Ball's experience of the localities, and intimate knowledge of the habits of the animals we were seeking for.

It is not in Dublin that I need speak of Dr. Ball's subsequent career. There is no scientific body in this city with which he was not more or less connected or identified; and the high position to which he had just been named, as President to Section D in the coming Meeting of the British Association, shows the esteem in which he was held by those best competent to form an estimate of his character. It is said you may know a man's character by his friends. Who were Robert Ball's most intimate friends in his own particular branch of study? Forbes, Thompson, Yarrell, Owen, Bell, Johnston, Allman, Patterson—names well known to you all, and some of them of world-wide celebrity; and I might add to these almost every zoologist of note in this country, and England, and many of the brightest ornaments of zoological science in the continents of Europe and America. How the blank which has been left by his death can be filled up, I know not. He has fallen in the very prime of his age, and in the full career of his usefulness, and there is no one equally qualified as he was to fill the many duties to which his time was devoted. As Secretary of the Royal Zoological Society in particular, his loss will be keenly felt, for it is not too much to say that it was by his exertions mainly—I may almost say wholly—that the Zoological Society was kept alive during the long period of national distress, and to him, in a great measure, is to be attributed its present prosperous condition. It was his favourite care—for he saw in it a great popular instructor—an engine for diffusing a knowledge of animals, their forms and habits, among the masses of the people. That it has largely answered this purpose, so far as the very limited funds at its disposal have allowed, will readily be granted; and those who have sat long on its Council will agree with me that without Dr. Ball's constant and unremitting oversight, that end could not have been attained. His ingenuity was great; he was constantly devising ingenious contrivances for insuring either the comfort or the better exhibition of the animals under his care;

and in the aëration and general management of the fish-tanks—the latest attraction of the Garden—he made many improvements.

But it would be endless to speak of the many ways in which he made his talents useful on every subject that engaged his attention—whether it were devising tanks, dredges, and nets for the zoologist; fern-cases for the botanist; rapid diagram paintings for the lecturer; or in arrangements for facilitating the dispatch of the official business in which he was so much engaged. I would rather dwell for a moment on that feature of his character which attracted and fixed the friendship of so many distinguished men, I mean his perfect openness and truthfulness, and the pleasure he took in imparting to any sincere inquirer whatever information was in his power on subjects connected with his favourite science.

He has not published much, but he has communicated much valuable and original information to others, by whom it has been made public. It is only necessary to turn to the works of Yarrell on Birds and Fishes, of Bell on Quadrupeds and Crustacea, of Forbes on the Starfishes and Mollusca, not to speak of Thompson's "Natural History of Ireland," to see that Robert Ball's researches in British Zoology very largely enriched those works with materials. Besides work in the field, he had read much on his favourite science. His zoological library was large, and he was well acquainted with the contents of his books, which were equally at the service of his friends and fellow-students as were the resources of his own mind. In a word, he lived for others more than for himself. Had he been as studious of fame as he was anxious to diffuse knowledge, his name might have been more widely known to those who were personally strangers to him; but he could not have been more beloved or more worthy of our love. I speak not of the esteem in which he was held by the public; the unsolicited cortege that followed his remains to the grave renders such eulogy needless.

It was moved by W. Andrews, Esq., seconded by Dr. Kinahan, and unanimously resolved—

"That this Meeting fully concurring in these statements, the President be requested to allow the Address just read to be inserted on the Minutes, and published in the Transactions of the Society."

The question of adjournment having been put, was carried unanimously, and the Meeting adjourned to the 17th of April.

ADJOURNED MEETING, APRIL 17, 1857.

Professor W. H. Harvey, M.D., M.R.I.A., F.L.S., President, in the Chair.

The Minutes having been read and signed,—

Dr. William Frazer read the following—

ON A DISEASE IN HYACINTH ROOTS, CAUSED BY CRYPTOGAMIC GROWTHS.

Few subjects are more difficult to follow satisfactorily than the development of the minuter forms of cryptogamic plants, and few, therefore, are enveloped in greater obscurity; unlike the sea-weed or the fern, which, from their gracefulness and beauty, at once attract our attention, the subject of my present remarks are by many considered to be peculiarly repulsive, and are associated in the mind with ideas of disease and decay; and although I must in fairness claim for some of them as full a share of beauty in external form as has, perhaps, been granted to any class of plants, still I cannot deny their frequent connexion with putrescent changes.

The exact nature of this connexion has been made the subject of many inquiries. Some have altogether denied that there was any real sequence between the development of these fungi and the disintegration of the organized tissues upon which they are found, considering their presence merely accidental, or at best of secondary importance, perhaps even useful in consuming the decaying particles; whilst others have attributed the changes which ensue in the rotting mass exclusively to their agency.

Much of the writings on this subject can be of little or no value, being mere theoretic ideas, without sufficient facts to warrant their reception; still, after laying these aside, we have a number of positive observations to aid us in determining the truth of those extreme opinions, and, as in many other matters, it appears to lie midway between both. To the microscope we owe much of what has already been accomplished in the investigation of these interesting growths and the study of their development, and amongst other remarkable advances in our knowledge we have ascertained by its agency that those lower forms of vegetable life, unlike the higher plants, may have, instead of a single kind of fructification, two, three, four, or even five different modes of reproduction; and also that, in place of a uniform manner of developing their structure, they may assume various states under different conditions, so unlike each other that nothing but the most ample evidence would enable us to connect them.

To illustrate my meaning I would merely mention the common and worthless blue mould, *Penicillium glaucum*, which is considered by our best observers to constitute in another form the well-known yeast plant, or barm, *Torula cerevisiæ*, so important in the process of fermentation and in making bread; and in still another state it develops into the

thick-matted masses of the so-named vinegar plant, which has attracted so much attention in the last few years.

To prepare for the statements I am about briefly making as to a very common mould producing a diseased state of the hyacinth roots, I may remind you that the silkworm dies of a similar disease (the muscardine, and from a similar cause) a botrytis spreading its mycelium throughout its body, and when it reaches the surface, then alone developing its perfect fruit, by which time, however, the caterpillar is either dead or its tissues wasted by its parasitic enemy, and its vitality almost gone. The following, too, is the opinion of the Rev. Mr. Berkeley, who holds, perhaps, the foremost rank amongst British authorities on these pests of vegetation, as to the cause of our disastrous potato rot, in his recently published work on Cryptogamic Botany:—"Unwilling as the scientific world has been to allow the agency of fungi in the potato murrain, as regards that, as well as the grape mildew, there are few dissentient voices now amongst those who understand the subject. The mycelium flourishes in the large intercellular spaces of the leaves, but penetrates also into stem and tubers, and at length makes its way either to the external surface or some free cavity, where it fructifies. In a damp warm day the progress of the disease may be watched with ease, and the parasite (*Botrytis infestans*) may be seen spreading rapidly in a circle, converting all in its way into a mass of decay." He admits, however, that other fungi contribute to the same end.

I shall now very briefly detail my own observations. I had last year some remarkably fine hyacinths growing; they had formed their leaves well and were commencing to bloom, when, after a time, I noticed that the expansion of the flowers had been completely checked; they dried up, and, becoming withered, my hopes of having flowers were thus ended. On examining the roots of the plants, I found them to be diseased; they had a very offensive odour, had assumed a pale-brown colour, and those which were farthest advanced in decay contained numerous bubbles of fetid gas, which I may state was not sulphuretted hydrogen. The decay appeared to me usually to commence from below, and to spread upwards in the roots, the epidermis still remaining firm after the interior was decayed. The microscope showed that the cells of the plant were separated from each other by lines of small dark dots which formed continuous chains; when these dots first appeared, the cells were healthy-looking, then became darker coloured, their contents broken up, and finally the cells themselves seemed to become isolated and detached, and to soften down.

Placed in fluid and carefully watched, I saw a small tuft of vegetation gradually arise from the side of some of the root, and after a few days its fibres crept beyond the fluid and developed into an Aspergillus (probably *A. candidus*). I may state that, on examining them, I found moulds developed on the hyacinth bulbs; I believe it is very common for them to be injured from this cause, the mould acting as a canker, and the part requiring removal with a knife. I had purposed repeating my investigations this spring, but was unable to do so from other

occupations. I would, in conclusion, merely remind you that this plant, or its close relative (*A. glaucus*), is the mould the presence of which is so highly prized in cheese that it is, I believe, often inoculated with it to produce an article fit for the epicure.

A series of microscopic drawings illustrated these remarks.

The President remarked that many other fungi, during the progress of their development, take on most dissimilar forms. Old botanists, hence, have often referred to distinct genera forms which have now been proved to be specifically identical. One genus, for instance, Sclerotium, of which some twenty or thirty species have been described, is found to be really made up of the young states of the genera Agaricus and Pezziza, so that Sclerotium is now nearly blotted out from our lists. Among the drawings exhibited to-night we see that a plant which we would be led to call Leptomitus, when traced to its full development, turns out to be Aspergillus. When in North America he was shown a number of so-called species of this false genus, at that time placed among the sea-weeds, which had developed themselves among the sulphate of copper solutions used in the electrotyping processes of the United States Survey. The plant had caused much annoyance and damage to the service, decomposing the solution, and throwing down the copper to such an extent as to render it nearly impossible to carry on the various processes required. He hoped Dr. Frazer would follow up this subject; the Irish fungi were nearly unknown, and a fine field was open for any one who would pursue the subject of the metamorphoses of these interesting plants.

The following communication was next read by Dr. Kinahan, Hon. Secretary:—

CARCINOLOGICAL NOTES: BEING A LIST OF THE CRUSTACEA PODOPHTHALMIA OF GALWAY MARINE DISTRICTS, CHIEFLY MADE DURING THE SUMMER OF 1850. BY A. G. MELVILLE, M.D., M.R.I.A., PROFESSOR OF NATURAL HISTORY, QUEEN'S COLLEGE, GALWAY, ETC.

The district in which the subjoined species were captured extends from Loop Head to Slyne Head; including the bays of Galway, Roundstone, and Birterbie, and the channels and seas adjacent to the isles of Arran; many of the species from this latter locality were dredged from a depth of sixty fathoms. To the species of but local occurrence the name of the precise locality is appended; with but very few exceptions, the specimens were obtained in 1850, and specimens of most of the species are to be seen in the Museum of the Queen's College, Galway.

LIST OF SPECIES.

Stenorrhynchus phalangium.—Very common.

Achæus Cranchii.—A single specimen was obtained at Antrim, 1850; the only previous record of it as Irish was a specimen formerly in the collection of J. V. Thompson, but for some years past lost.

Inachus Dorsettensis.—Common.

Inachus dorynchus.—Common.

Pisa tetraodon.—Roundstone.

Hyas araneus.—Very common, littoral.

Hyas coarctatus.—Common, a deep-sea species, occurs from ten fathoms downwards.

Maia squinado.—Very common, deep sea.

Eurynome aspera.—Common in suitable localities.

Xantho florida.—Very common; the unicoloured variety just as common as that with black-tipped claws.

Xantho rivulosa.—Rare, two specimens only have occurred among dozens of *X. florida*, Galway Bay.

Cancer pagurus.—Common, but does not attain anything like the same dimensions here as on the eastern coasts, and is also much inferior as an article of food.

Pilumnus hirtellus.—Common.

Pirimela denticulata.—Rare. Roundstone.

Carcinus mænas.—Common.

Portumnus variegatus.—Carapaces of this species occur, rarely, in Galway Bay;—I have not succeeded in finding the animal itself.

Portunus puber.—Common.

P. corrugatus.—Common.

P. arcuatus.—Very common.

P. depurator.—Very common.

P. marmoreus.—Roundstone, 1850.

P. pusillus.—Common.

Pinnotheres pisum.—Very common in *Mytili* and *Cardium edule*.

Gonoplax angulatus.—Rare. Roundstone, 1850.

Ebalia Pennantii.—Common.

E. Bryerii.—Common.

E. Cranchii.—Common.

Atelecyclus heterodon.—Common.

Corystes Cassivelaunus.—Common.

Thia polita.—Galway Bay, by digging; of this interesting species I have obtained specimens each year since my first discovery of it here in 1850; three were obtained in March last (1857), two of which are at present alive with me. It is exceedingly local.

Pagurus Bernhardus.—Very common.

P. Cuanensis.—Common.

P. Ulidianus.—Common.

P. Hyndmanni.—Common.

P. lævis.—Common.

P. Forbesii.—Rare. This species was obtained in 60 fathoms water off the south isle of Arran, its first record on the Irish shores.

Porcellana platycheles.—Very common.

P. longicornis.—Very common.

Galathea squamifera.—Rare.

G. strigosa—Rare.

Munida Rondeletii.—Galway, rare.

Palinurus vulgaris.—My experience of the occurrence of this species would lead me to believe it rare here.

Astacus fluviatilis.—Rivers, common.

Homarus vulgaris.—Very common.

Nephrops Norvegicus.—Rare.

Crangon vulgaris.—Common, local.

C. fasciatus.—Isle of Arran, rare.

C. spinosus.—Isle of Arran, rare.

C. sculptus.—Isle of Arran, rare.

C. bispinosus.—Arran. This species, now first added to the Irish list, and of extreme rarity in Britain, was established by Hailstone on the authority of a single specimen; several specimens occurred to me, and there can be no doubt of its specific distinction from *C. trispinosus.*

Alpheus ruber.—Isle of Arran, 60 fathoms. This species is now first added to the Irish list; the specimen is particularly interesting as having been obtained in dredging. British specimens heretofore recorded were all obtained from the stomachs of fishes.

Nika edulis.—Roundstone, rare.

Athanas nitescens.—Ballyvaughan, county of Clare. Under stones between tide-marks; common, but local.

Hippolyte varians.—Rare.

H. Cranchii.—Common.

H. Mitchelli.—Rare; its first record as Irish; this specimen was obtained by me in 1850, and then laid aside as nondescript; it has since been described from Weymouth under the above name by W. Thompson.

Palæmon serratus.—Very common.

P. squilla.—Very common.

P. Leachii.—Common in autumn.

Mysis vulgaris.—Common.

Besides these, numerous specimens of the genera Alauna, Bodotria, and Cuma have been met with. These genera, or at least Bodotria, are synonymous with *Scorpionura* of J. Vaughan Thompson, as may be seen by examination of the specimens under that name in his collection in the Royal Dublin Society's Museum.

Professor Kinahan next submitted the following—

NOTES ON THE FOREGOING PAPER, WITH A SUPPLEMENT TO HIS LIST OF DUBLIN CRUSTACEA.

The interesting paper just read contains several species not included in either of the papers on this subject which I have had the honour to submit to your Society during the present session. In order that our Transactions for this year may contain all that is known of the distribution of this family of Crustacea in Ireland, I have supplied the distribution of these species, taking the opportunity of adding, at the same

time, a supplement of those eastern species (some of them of extreme interest, and one of *H. pusiola*, not previously here recorded), which have occurred to me since.

Although such a large number of Crustacea (sixty-three out of eighty-seven species) are recorded in this paper, yet, during a day's dredging in Galway Bay on the 27th of March last, when in company with Professor Melville, among twenty-two species which rewarded our labours, three occurred which had not been previously met with there by him, viz., *Portunus holsatus*, and *Pandalus annulicornis*, and a young specimen of *Portunus marmoreus*, a species hitherto unrecorded save in Birterbie Bay.

DISTRIBUTION OF SPECIES NOT INCLUDED IN DUBLIN LISTS.

References as in former paper—A. G. M., Professor Melville.

Achæus Cranchii.—The only Irish specimen on record, formerly in J. V. Thompson's collection, was lost previous to the transfer of that collection to the Royal Dublin Society.

Pisa tetraodon.—First discovered by W. M'Calla.

"I am the only person who as yet has found this species in Ireland; its habitat is within two miles of Roundstone, in a pool at about half tide-mark. As particular situations are distinguished by algæ growing in the pools, it may, therefore, be well to state the plants in that under consideration:—*Gelidium corneum*, *Polys. fruticosa*, and *Cystos. ericoides*. Owing to changes in the pools, I have not lately obtained this species; I have not found it in lobster-pots, and rarely under stones."—*Saunders' News-Letter*, January 9, 1845.

Xantho rivulosa.—I find I was in error in stating this crab had not occurred to M'Calla. At least, a card has lately turned up in the Royal Dublin Society's collection, labelled "*Xantho florida*, Roundstone," which was most probably part of the collection purchased from M'Calla; on this, undistinguished by any mark from numerous specimens of *X. florida*, is a fine male specimen of *X. rivulosa*, which must have escaped M'Calla's notice. It would then appear to be generally distributed along the south and western coast.

Hook Head (R. B.)—Valentia Island, Galway Bay (A. G. M.), Roundstone Bay (W. M'C.), Portrush (O. C.)

Portunus marmoreus.—Galway, Roundstone (W. M'C.)

Ebalia Bryerii.—Belfast (O. C.), Galway (A. G. M.), Roundstone (W. M'C.)

Ebalia Cranchii.—Belfast (O. C.), Portmarnock, Co. Dublin, *q. v.* (R. Ball), Roundstone Bay (W. T.)

Thia polita.

I had the pleasure of seeing this crab dug out of its sandy home. Professor Melville having kindly accompanied me to the station where, in 1850, he first met the species,—a fine female specimen, that now before your Society, was the only one met with. It bore the journey to

Dublin in a small tin box packed in wet sand remarkably well, and has since been kept in a small vivarium.*

This crab has given rise to some discussion as to whom the priority of its discovery in Ireland is due. Having been lately looking over the back Transactions of this and other Societies, I find myself in a position to clear up much of the mystery of this "knotty" point. I hope, therefore, it will not be considered to be trifling with the time of the Society if I lay before them the results of these investigations.

Thia polita was first detected by that indefatigable collector, W. M'Calla, in Roundstone, in 1845; he failed in identifying it, as the following extract from a paper read by Dr. Charles Farran before your Society, January, 1845, proves:—

"This winter I have added two species, *Portunus marmoreus*, I have not been able to determine the genus of the other: one thing is certain, it is new to Britain, if not to science. The undetermined species was found in shallow water, at extreme low water-mark; I obtained five specimens. Having paid considerable attention to the Crustacea, I had no hesitation in writing to Dr. Scouler that I had been so fortunate as to have added a new genus to this department."—*Saunders' Newsletter*, January 9, 1845. (*Vide* also Report of Dublin Natural History Society for 1844–45, p. 17.)

The species was subsequently identified, and published by Professor Scouler, in a paper laid before this Society in January, 1846, as the following shows:—"Dr. Scouler then brought forward the discovery of, and addition to, the British Crustacea of *Thia polita*. This remarkable and beautiful little crab was found near Roundstone, Connemara, by Mr. M'Calla, where it burrows in sand; only one species of the genus is described as European, and this discovery is an important addition to the Crustacea of Britain. A very fine female specimen was exhibited from the Museum of the Society; a smaller one, a male, is in the collection of the Dublin Society."—*Saunders' Newsletter*, January 9, 1846. *Vide* also Eighth Report of Dublin Natural History Society, p. 8.

M'Calla himself also brought the discovery before one of the Evening Meetings of the Royal Dublin Society, held 28th of February, 1846. (*Vide* Proceedings, Royal Dublin Society, vol. lxxxiii., Appendix xv., p. cxiii.; and vol. lxxxii., Appendix v., p. xlv.) This last paper purports to have been read on the 10th of January, 1846, but must have been corrected subsequent to this date. Professor Scouler, furthermore, presented specimens to the British Museum, as appears by reference to their Catalogue published in 1847.

By some mischance or other, however, it escaped the notice of English naturalists, and when in 1850 Professor Melville, ignorant of its previous occurrence on our shores, met with the species in Galway, he, having first identified it from the description given by Milne Edwards, forwarded specimens to Professor Bell, by whom it was published as an

* Still alive and healthy, although now three months in confinement—June 28, 1857.

addition to the British Fauna in the Supplement to his British Stalk-eyed Crustacea. Professor Melville himself was one of the first to point out the apparent injustice done to M'Calla.

The species, from my experience of it in confinement, is sluggish, but a determined animal feeder, destroying even large bivalves, Actiniæ and Palæmons, some 2 inches long; it is also apparently a night-feeder. Galway Bay, Roundstone (W. M'C.).

Munida Rondeletii.—Belfast (W. T.), Youghal (R. B.), Cove (J. V. T.), Galway (A. G. M.), Roundstone (?) (C. F.).

Crangon spinosus.—Cove (J. V. T.), Galway (A. G. M.).

Nika edulis.—Cove (J. V. T.), Roundstone (A. G. M.).

Athanas nitescens.—Lahinch (W. T.), Ballyvaughan (A. G. M.), Roundstone (W. M'C.).

SUPPLEMENTAL DUBLIN SPECIES, pp. 80–87.

Pirimela denticulata.—Dalkey Sound; dredged a single female specimen, May, 1857, loaded with ova. After it had been kept in a tank for three weeks, the ova changed their colour from a bright salmon-red to a dirty brown: this change examination with the microscope showed to be dependent on the development of the zoes in the ova, their black eyes showing plainly through the integuments. I was unable at the time to examine them further; and the following day, to my great regret, I found that the ova were all shed, and the tank filled with zoes.

These were extremely active, tumbling about in all directions, swimming by alternately rolling up and unclosing their jointed bodies, and throwing complete summersaults; when they rested, it was on their backs, the body supported on the dorsal spine. I do not know whether this is the normal position for them or not. The abdominal false feet were kept in perpetual motion.

In figure (Plate IX., Figs. 4, 5) they appear identical with zoes bred by J. V. Thompson from *Canc. pagurus* (Zoological Researches, Plate VIII., Fig. 1), as might have been expected from the close relationship of the genera; indeed, I am inclined to think that the zoes of the Brachyura, at least, will be found to be nearly undistinguishable, the apparent difference in the figures published arising from the difficulty of making perfect microscopic observations, arising from the transparency of the various parts. If we compare the figures here given with Thompson's figure of zoea of *Pinnotheres pisum* (Ent. Mag., vol. iii., p. 85; Bell's British Crustaceæ, p. 125), we will at once perceive their strong similarity. Although I examined twenty or thirty specimens of this zoe, I only succeeded twice in getting the lateral spines in full view: they are represented rather too long in my figures.

The spiny curvature was as follows:—Arising out of the centre of the carapace a long, curved horn; between the eyes a curved rostrum; on each branchial region a short scimitar-shaped horn; and lastly, a very short, slender, hollow horn, arising from the posterior edge of the carapace at its junction with the abdomen. Three fine hairs, also, are found arranged in a line along the median line of the carapace posteriorly.

The abdomen consists of five segments. The first, or that nearest the cephalo-thorax, with a protuberance about half-way down, and furnished with a hair (represented as a spine by the artist) at its inferior external angle; this joint is somewhat quadrilateral. The second, third, and fourth decrease gradually in size, and the terminal joint ends in a semilunar tail (Fig. 6, back view, magnified 350 diameters) furnished with six tubular spines, each distinctly articulated to a jointed peduncle; the edges of these spines are finely serrately ciliate, and the internal pairs furnished internally each with three hollow spines communicating with the cavity of the primary spine; a short spine is also found at the origin of each semilunar arm; a plate of very peculiar form arises from the articulation of the fourth and fifth joint posteriorly, and projects below the termination of the tail; in other particulars my specimens agree with J. V. Thompson's descriptions.

The circulation, as seen under a power of 350 diameters, is extremely curious: a closed (?) pulsatile vessel running down the back, with dilatations at each articulation; in this a regular flux and reflux of fluid might be seen, accompanied by dilatations and contractions of the dilated portions. Besides this, a regular circulation, whose course was not easy to make out, was to be seen passing along the sides and through the horns, and even into the three little hollow spines with which the caudal primary spines were furnished.

Antrim (W. T.), Dublin, Dingle (W. Andrews), Lahinch (W. T.), Galway (A. G. M.), Roundstone (W. M'C.)

Ebalia Pennantii.—Bray, May, 1857, Scallop bed. The late Robert Ball, LL. D., showed me a specimen from Dalkey.

Belfast (O. C.), Dublin, Cork (C. C. S., J. V. T.), Galway (A. G. M.), Roundstone (W. M'C.).

Pagurus lævis.—What I take to be this species has occurred to me both in Dalkey and also at Bray; it differs from *P. Hyndmanni* chiefly in the comparative length of chelæ.

Portaferry (W. T.), Dublin (?), Galway (A. G. M.).

Galathea nexa.—A small species, which I take to be this, occurs pretty plentifully in Dalkey Sound and Bray, in 12–30 fathoms; it spawns in March, April, and May.

As contrasted with *Galathea squamifera*, the following points call for notice:—

Rostrum short, furnished with *four* flattened, hollowed teeth on each side; the hindmost pair situated on the orbit. (In *Gal. squamifera*, *five* spines, the hindmost two as *G. nexa*). Anterior pair of legs narrowed, elongate, covered with a few tubercles, terminating, for the most part, in a single spine; some, however, pass into denticulate squamæ: these tubercles are arranged on the hands in *nearly parallel longitudinal lines*, contrasting with the densely squamiferous anterior limbs of *G. squamifera*. The hands are *narrow and elongate*, *the fingers nearly parallel*, finely denticulate, scarcely hairy, terminating in a fine nail; they are slightly spinous on the exterior. External foot-jaws, second joint equalling third. The description of *G. nexa*, in Bell, is so suc-

cinct that I am not quite sure whether this may not be a nondescript species.

Antrim (W. T.), Dublin (?)

Palinurus vulgaris.—Although rare, there can be no doubt this species has occurred in Dalkey Sound, and of large size.

Astacus fluviatilis. — Once, at least, in Bray River ; common in streams about Maynooth, and also formerly taken in the Liffey. I have seen specimens from the following counties:—Longford, Cavan, Tipperary, Kildare, Dublin, Kilkenny, Meath. It is probably to be found nearly all through Ireland.

Crangon fasciatus.—Of this rare species I met with specimens at Sandycove, in the sandy pools, in a zostera bank at extreme low water. Spawns in May. Every one of my specimens shows the broad black band most distinctly.

Dublin, Bray (R. B.), Galway (A. G. M.)

Hippolyte varians.—This species occurs in great numbers in the sand-pools among the zostera banks at Sandycove, near Kingstown; spawns in May. The specimens vary remarkably and beautifully in colour: pink, red, salmon, emerald-green, cobalt-blue, gray, chocolate-brown, opal white, are among the prevailing tints; the ova of a chocolate brown.

It is remarkably sensitive of handling; in no case could I succeed in keeping it for over forty-eight hours in a tank, although specimens of *Crangon fasciatus* and *Mysis chameleon*, from the same locality, lived with me for days. A volume might be written on the forms of the beak of this species. I have figured (Plate X.) the best-marked varieties, which occurred in the following proportions:—

Plate X., Fig. 1.—*a*, Normal type; rostrum nearly straight; apex bidentate, directed upwards, upper tooth shortest; below two teeth, the anterior much posterior to the upper tooth of apex; proportional frequency of occurrence, 63 per cent.

Fig. 2.—*b*, Rostrum straight; apex tridentate, teeth directed forwards, upper and lower teeth nearly equal in length; below, one tooth only; proportional frequency, 25 per cent.

Fig. 3.—*c*, Rostrum strongly curved upwards, scimitar-shaped; apex tridentate, upper tooth slightly longer than lower; below, a single tooth; proportion, 8 per cent. N. B. The whole animal is much slenderer than the normal type: query, *a species?*

Fig. 4.—*d*, Rostrum straight; apex broadly truncated, directed forwards, quadridentate, apical teeth very minute; below, two teeth; proportion, 2 per cent.

Fig. 6.—*e*, Rostrum straight; apex acuminate, *simple*, directed upwards; rostrum with two teeth below. One specimen out of 300 examined.

Fig. 5.—*f*, Rostrum straight; apex bifid; rostrum with *three* teeth below, viz., one beneath apex and two closely approximated in the broadest portion of the rostrum. One specimen.

All these specimens, in addition, have the basal superior tooth (cha-

racteristic of the species). Another curious form had the the rostrum very much curved upwards, apex simple, and teeth below absent. These all were from the same pools, in company with the next species, *Mysis chameleon*, *Carcinus mænas*, *Cancer pagurus*, and that strange edriophthalmous Crustacea, *Apseudes talpa*, its first record, I believe, on the Irish coasts.

For distribution, see Paper read in April.

H. Cranchii (Plate X., Figs. 7 and 8).—In the same pools with last, but rarer; in spawn in May; spawn of a chocolate-brown colour; varieties with three and four teeth on the rostrum occur.

H. pusiola (*Kröyer*) (Plate IX., Fig. 2, *a*, *b*, *c*; and Plate X., Figs. 9, 10).—I first met this species, in 1854, in Dalkey Sound, when I laid it aside as a variety of *H. Cranchii*. The constancy of its characters have since caused me to alter this opinion, and, not finding it described in any of the English or French authorities, I was led to describe it as new, under the name of *H. Andrewsii*. Since then, however, a paper of Kroyer's on the Hippolytes of the North, published in the "Royal Danish Society's Transactions," has come into my hands, in which I find a species described as *H. pusiola*, which I must look on as identical with that under consideration: I, therefore, feel compelled to adopt Kroyer's name, for the present, or until better informed on the subject.

The species is known to the English naturalists, by whom it is looked on as—that zoological conveniency—a "mere variety" of *H. Cranchii;* but the characters which mark it out are so constant and trenchant, that I feel no hesitation in asserting its claims to *specific* distinction, and most probably it will be found to be one of our best-marked northern types, as I have not seen any specimens of it in southern or western collections, and the only notice I find of it in English works is by Dr. Howden, Scotland.

HIPPOLYTE PUSIOLA (*Kroyer*).

Rostrum short, curved upwards; *apex acuminate*, 3–4 dentate above; below unarmed; a strong tooth arising from carapace immediately over eye; median plate of tail 4 pairs of spines; wrist of second pair of legs 4-jointed.

The whole animal is much larger and more truncate than *H. Cranchii;* the rostrum narrower; apex slightly curved upwards, simple; the rostrum armed with 3–4 curved teeth above; external antenna as long as the entire body; the antennal scale rounded at its inner superior extremity; the lateral tooth terminal and its peduncle strongly toothed externally; internal antennæ hairy, the inferior external angle of the articulation prolonged into a curved scimitar-shaped lobe, the superior angle prolonged into a tooth; second and third articulations also toothed; anterior feet slightly shorter than antennal scale, stout.

Second pair of feet,—wrists made up of four articulations, the total number in the whole limb being eleven, including the hand; the first, second, and third very short and somewhat triangular; the fourth, fifth, and sixth long, slender, and equal among themselves; seventh,

slightly shorter, cylindrical, slender, a few scattered hairs over its external surface; eighth and ninth very short, scarcely conjoined equalling seventh, equal and globular; tenth, equalling seventh. A strong tooth over each eye at base of rostrum, and a small tooth over origin of antennæ.

Colour, rose-pink or green, though there is much variety in this; one specimen (a female), taken in May, was coloured as follows:—Carapace, a transparent clear pink, with which the emerald-green masses of extruded ova contrasted most vividly, tail and segments of legs being banded with white and rose colour. Another specimen was even more vividly coloured:—Carapace clear cobalt-blue, through which the emerald-green masses of ova shone, the remainder of the body a clear pink; the legs prettily banded with a darker red.

It has only occurred to me in comparatively deeper water, as at Bray and in Dalkey, where it is frequent in the lobster and crab pots. Of its distribution nothing is known: it has been recorded in Scotland by Dr. Howden, from Frith of Forth and Orkney.

The characters of the rostrum and carapace; second pair of legs, median plate of tail; size; and difference of locality separate it markedly from *H. Cranchii* (*vide* Plate X., Figs. 7, 8, 9, 10, and Plate IX., Figs. 2A, 2B).

Palæmon squilla.—Extremely common in rock-pools, especially among *Enteromorpha intestinalis*. In ova in May, April, and June. Of one remarkable form of this species (?) I have figured the beak (Plate X., Figs. 11, 12, 13, 14); it is invariably much smaller than the normal type, and frequents pools which are less frequently visited by the tides. In colour and other characteristics I find such a close accordance, I must look on the characters drawn from the beak as not of specific importance, the only other difference being in the comparative weakness of the didactyle hands. The following are the varieties in the number of teeth of the rostrum met with:—Apex bidentate, above 7–10, below 2–4; apex simple, above 7–9, below 2–3; the commonest form being 7 or 8 above, apex bidentated, and 3 below.

Belfast (W. T.), Dublin, Galway; doubtless confounded with *P. serratus* in lists.

P. Leachii.—I have seen no authentic Dublin specimens of this species; all those shown me either preceding species, or *P. varians*. I have collected specimens in Galway, and Professor Melville showed me numerous specimens collected there by him. The specimen thus named in J. V. Thompson's collection is not this species, but the variety (?) of *P. squilla*, described above.

Dublin (?), Galway.

Mysis chameleon.—Much commoner than I formerly stated; very abundant in sand-pools; in ova in March, April, and May. The ova are easily hatched, and the young are similar to the parent when extruded.

Before concluding, it may be interesting to compare the relative distribution of the genera and species in the east and west, when we arrive at the following results, excluding from our comparison those strange forms, Bodotria, Alauna, &c.

Brachyura.		
Common to both districts, ...	23	
Unrecorded in east, made up as follows:—Achæus, *Pisa*, Maia, *Xantho* (3?), Portunus (2), Ebalia (?), *Thia*. Those genera peculiarly typical italicized, .	10	
Unrecorded in west, ...	0	
Brachyuri,	—	33
Anomoura.		
Common to both, ...	11	
Unrecorded in east, viz., Pagurus (1), *Munida* (?), .	2	
Unrecorded in west, viz., Pagurus (1), Galathea (1),	2	
Anomoura,	—	15
Macroura.		
Common to both, ...	11	
Unrecorded in east, viz., Crangon (2), *Alphæus*, *Nika*, *Athanas*, Palæmon (1), Hippolyte (1), . .	7	
Unrecorded in west, viz., Hippolyte (1), Crangon (2), Palæmon, ...	4	
Macroura,	—	22
Stomapoda, common to both, ...	2	
Omitted in above list, ...	8	
	—	10
Total *Crustacea podophthalmia*, ...		80

The Irish species unnoticed in these lists are—

Inachus leptocheirus.

Belfast (O. C.), Clifden (W. T.)

Xantho tuberculata, Polybius Henslowii, Pinnotheres pinnæ.—Obtained once in the south.

Gebia deltura, Callianassa subterranea, Calocaris Mac Andreæ.—Obtained once in the north.

Pasiphæa sivado.—A single specimen in Dublin Bay.

Careful research will, doubtless, disturb these conclusions slightly; and I am sure that many unrecorded species, especially among the Anomoura and Macroura, yet remain to reward the labourer in these prolific fields of watery research.

In conclusion, with regard to the provisional species recorded in my last paper, as I suspected, *Porcellana priocheles* appears to be one of the young states of *P. longicornis; Pagurus Eblanensis* I strongly suspect is the true *P. Ulidianus* of W. Thompson; and *Portunus carcinoides* (Plate IX., Fig. 3, *a*, *b*, *c*) is a good species; it comes very close, however, to Otto's *P. infractus*, which is included by Bell among the syno-

nyms of *P. longipes*, Risso, from which the trilobed front and length of legs would separate my specimen.

I would also correct an error in my description of *C. Allmanni* (pp. 81, 82), in describing the arm of that species as smooth in many specimens: it is distinctly spined.

After the conclusion of Dr. Kinahan's paper, the Chairman declared Alexander Henry Haliday, Esq., F. L. S., M. R. I. A., duly elected an Ordinary Member.

The meeting was then adjourned till May.

FRIDAY EVENING, MAY 1, 1857.

Charles P. Croker, M. D., M. R. I. A., V. P., in the Chair.

The Minutes having been read and confirmed,—

Mr. W. Andrews read the following—

NOTES ON THE ORNITHOLOGY OF THE COUNTY OF KERRY.

It has always been my opinion, that the zoology of the western portions of this country, embracing the whole range from north to south, had yet to be developed, and that it may be said that scarcely two-thirds of the species have as yet been recorded. Our knowledge of the marine zoology of the western coasts is still very imperfect, especially as regards the deep-water species. Thus, it were an interesting inquiry to trace the peculiarity of habits of those species which, though common on our shores, and animals of the most delicate and fragile texture, are yet found of frequent occurrence in deep-water soundings.

My chief business this evening is with reference to notes on the birds of this country that are considered "occasional or very rare visitants." These expressions frequently appear in works on British ornithology, and I am satisfied must be considered as owing to the want of proper information, arising from a lack of observation throughout each season of the year, and especially from ignorance of the characteristics and habits of birds in the immature states.

There are several of the gentry whose tastes lead them to make collections of the birds of their immediate neighbourhood, and others who occasionally note occurrences that appear singular or strange to them; but still there is a general dearth of knowledge of seasonal records throughout the country. The collections of my friend, R. Chute, Esq., of Chute Hall, near Tralee, testify, by the great amount of interesting objects he has obtained, what individual zeal can accomplish. The subalpine districts of Kerry, with their numerous lakes, estuaries, extensive marshes, and wooded glens, still afford ample fields for observation; and we shall yet learn, through well-directed and continued observations, that the records of—"must only be considered of extremely rare occurrence," should be, "by no means uncommon."

Thus, the immature Iceland Gull (*Larus Islandicus*), I am sure, is, at certain seasons, frequent on the west coast. It has been shot near Tralee, and the immature bird has been seen in numbers.

In the Transactions of this Society are recorded the immense flocks of the Greater Shearwater (*Puffinus major*) seen in Dingle Bay, and also notes of the Bridled and Brunnich's Guillemots (*Uria lacrymans* and *Brunnichii*), having been observed breeding on the Tiraght Rock. The former bird, with the eggs, have been obtained at the entrance of the Shannon, by Henry Burton, Esq., of Carrigaholt Castle. The King Eider Duck (*Somateria spectabilis*), and several rare species of Tringa, have also been captured in Kerry.

The Martinique Gallinule (*Gallinula Martinico*), which was captured in the living state in a drain at Clehane, Brandon, county of Kerry, was at first by Mr. W. Thompson supposed to be, and described as, the Sicilian Gallinule (*Porphyrio hyacinthinus*), from the supposed impossibility of a bird of the United States of America being met with in Ireland. An examination of its characters satisfied me it must be the Martinique Gallinule, and I wrote so to Mr. W. Thompson, who afterwards admitted that my views were correct.

The Dusky Petrel (*Puffinus obscurus*), a bird of Australia, was also obtained alive off Valentia Island, and was exhibited in this Society in 1854.

The Bohemian Waxwing (*Bombycilla garrula*) has several times been noticed in Kerry. A very beautiful specimen is in the Museum of the Society, taken near Miltown, county of Kerry, and presented through the kindness of one of the Members, Joseph Anderson, Esq.

You have already had recorded the Membranaceous Duck (*Malacorynchus membranaceus*), which was shot in Castlemaine Bay, where six were observed together, and supposed by the sportsman to have been teal. It has been remarked, that this bird "could not have occurred in Kerry except as one escaped from confinement." I believe in no British collection has this species existed but in that of the late Earl of Derby, and I have been informed that none were lost from that collection. It might just as well be imagined that the Great Spotted Cuckoo (*Cuculus glandarius*) and the Belted Kingfisher (*Alcedo alcyon*) were escapes from confinement.

The two very fine specimens of the Crane (*Grus cinerea*) which are in our Museum, were shot the same season in this county, one of them near Ballinskelligs Bay, county of Kerry, out of a flock of five. It was sent to me by my esteemed friend, the late Maurice O'Connell, Esq., of Derrynane Abbey, supposing it to be the Great American Heron (*Ardea Herodias*), which, with the exception of its great size, is similar to the Common Heron of Europe. The former bird averages 4 ft. 7 in. in height, and weighs 7 lbs., while the latter but 3 ft. 3 in., and weighing 4 lbs. *Ardea Herodias* frequents the gloomy solitudes of the tallest cedar swamps of New Jersey; the Common Heron (*A. cinerea*) is not an inhabitant of the United States. The extreme length of the crane obtained in Kerry was 4 ft. 7 in., and its weight was 12 lbs. Mr. O'Con-

nell was led to suppose the bird American from numerous incidents he had noticed: he was an admirable shot and sportsman, and a great admirer of the writings of "glorious old White of Selborne," as he termed him.

Thus in one of his numerous communications he remarks with regard to the woodcocks:—

"My observations lead me to suppose that we have two immigrations—one from the northern parts of Europe, the other from America. I have shot what certainly appeared to be two varieties, if not distinct species: one much smaller than the ordinary woodcock, more of a rufous colour, and destitute of the varied markings which distinguish the latter. I have met male and female of both kinds, and have shot both kinds late in the season when paired, each with a mate of its own description. A friend who was with me in the winter of 1840 (Captain Broderick, 34th Regt.), and who had just returned from Canada, where he had shot many dozen braces of woodcocks, was at first incredulous as to the fact of the immigration from America. On going out with me it happened that the first couple of birds we flushed were of the smaller kind. We met them at some hundred yards' distance from each other, and at an interval of a quarter of an hour on an open mountain, where we had a full opportunity of observing them. He appeared surprised on seeing the first; but when the second rose he turned to me and said, 'You are right—these are exactly the American birds, wherever they came from.' Unfortunately we did not get shots at either of these birds, and killed but one of the kind after, as the day became bad; but he admitted, on examining that closely, that it was, as he called it, 'a Yankee bird.'"

The American woodcock differs much in size from that of Europe, the male bird scarcely averaging six ounces, and the female eight ounces; while the European birds exceed twelve ounces. The lower parts and breast of the European woodcock are marked with large spots and zigzag transverse lines and bars of black on a pale dull yellow and gray ground. These marks are altogether absent in the American bird, whose colour on the breast is bright ferruginous; the back and scapulars are of a lighter colour, and not so deeply marked. The small specimen which is now exhibited was obtained from Nova Scotia.

One of the Mr. O'Connells, of Grena, near Killarney, informed me that some years since he had seen nailed on a door by one of the gamekeepers a jay, identical with the American blue jay (*Garrulus cristatus*).

In the month of June, 1855, when for a few days at Killarney, I met on the grounds of the Lakeview Hotel a man with a young bird of the spotted eagle (*Aquila nævia*). I was anxious to obtain it, but he said that he had promised it for sale to a gentleman whose return he was waiting from boating on the lake; his price was £1. On the following morning he called to leave the bird with me; but both at the Hotel and at Mr. Boylan's (Lord Kenmare's steward), in whose charge he wished to leave it, it was refused, as I was absent. I could obtain no trace of

the bird, as the man had to return to his home westward in the Reeks, in which part of the country, in a mountain towards Cahirciveen, he had taken the bird from the nest. Its much smaller size, and the peculiar spotted markings which characterize the young state and bird of the first year left no doubt on my mind as to the species.

The Mergansers have been noticed to remain in Kerry throughout the year; and the Scaup Duck (*Anas marila*), with the eggs and the young, has been taken in an inland lake.

The bird which I now present to the Society, the Horned or Sclavonian Grebe (*Podiceps cornutus*, *P. obscurus*, in the young state), and which, in Thompson's Birds of Ireland, is quoted—"can be positively announced only as an occasional visitant," was lately obtained at the mouth of one of the streams near Lough Caragh, county of Kerry, where, no doubt, others will be met.

Through Europe this has the widest range of all the Grebes; but it has been considered as extremely rare in the British Isles. The markings are very perfect in this specimen; but the dark frill and the bright chestnut-coloured feathers or horns, which characterize the species, are not shown except in the breeding season. It is distinguished by its bright chestnut rufous-coloured neck, and by the rufous-coloured marks passing from the base of the bill to and through the eye to the occiput. This at once distinguishes it from the rare species, the Eared Grebe, *P. auritus*, which has not the rufous-coloured neck; the markings of the bill are also characteristic, the bill of *P. cornutus* being black, tipped with yellow, and the lower mandible marked with yellow, the belly silvery, and of a soft, silky texture.

Mr. J. B. Doyle remarked on the extreme interest of these observations. He thought it evident that, if we had more certain records of this kind, many birds at present marked in our list as rare stragglers would be found to be more frequent visitors, especially in the west. There were many gentlemen resident in that part of Ireland who possessed interesting collections of birds captured in that district. He might mention one. In the collection of Edward Burton Eyre, of Clifden, the following rare birds, all captured about the Burren, were to be seen:—The Glossy Ibis (*Ibis falcinellus*), Bohemian Waxwing (*B. garrula*), Siskin (*Carduelis spinus*), Sabine's Snipe (*G. Sabini*). He had himself had the good fortune to have seen alive the specimen of the Martinique Gallinule to which Mr. Andrews referred, and there could be no doubt as to the circumstances connected with its capture. It was found alive, but exhausted, in Brandon, in a creek, but died not long after its capture.

The Rev. Professor Haughton brought forward a motion by which a new class of Members, to be called Associates, should be formed (*vide* end of Transactions). Undergraduates of the University to be especially eligible for this class of Membership. The Associates to have privileges of Members, to be resident in or about Dublin, and to be elected

by a vote of the Society, on the previous recommendation of Council. The subscription for this class to be limited to 5*s.* a year, to cover expenses.

This was seconded by Dr. G. B. Owens, and, after having been fully discussed, was passed unanimously.

By a resolution of the Society it was also determined that Corresponding Members, paying 5*s.* annually in advance to the Treasurer, should be entitled to the Monthly Report of the Society's meetings, and a copy of the Society's Proceedings.

After due ballot, Edward Hamilton, M. D., 8, Stephen's-green, was declared duly elected an Ordinary Member.

The meeting then adjourned till June.

DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

FRIDAY EVENING, MARCH 20, 1857.

R. Ball, LL.D., President, in the Chair.

The Minutes of last General Meeting having been read, were signed by the Chairman.

Mr. A. H. Haliday, V.P., read the following—

NOTE ON A PECULIAR FORM OF THE OVARIES OBSERVED IN A HYMENOPTEROUS INSECT, CONSTITUTING A NEW GENUS AND SPECIES OF THE FAMILY DIAPRIDÆ.

The perusal of Siebold's book on Parthenogenesis, which lies on the table, along with Mr. Dallas's translation of it into English, has served to remind me of an observation, made many years since, upon a species of the family Diapridæ, which was not infrequent in one spot near the house in the country where I then resided, and of which none of the specimens appeared to differ from the rest in any of the external characters by which the sexes are generally distinguishable in this family. I considered all those I had found to be females; but for the sake of greater certainty I proceeded to dissect two specimens, paying particular attention to the evidence on that point. While the result confirmed my first impression, it also brought to light a very unusual form of the ovaries, drawings of which I now lay before the Association. I will not presume to say that the phenomena are sufficient to verify the conjecture which they suggested to me at the time, that a physiological arrangement was presented here, such as is established by abundant evidence in the case of the Gallflies (*Cynips*, &c.). On this supposition, the presence of females only would be explained as being something more than a contingency depending upon circumstances of time and place.

I propose at the same time, with your permission, to characterize this very distinct and hitherto undescribed form in the family by the generic and trivial name under which I have formerly communicated specimens to some of my entomological correspondents in these countries and abroad.

The family Diapridæ is undoubtedly closely allied to the Proctotrupidæ (*Proctotrupes*, *Monomachus*, *Pelecinus*), of which, indeed, the older authors considered it as forming part. If it is thought better not to multiply families, the two may still be kept united under the latter name, provided that the nature and distinctions of the two subordinate groups, they will in that case constitute, be kept in view not the less. For our immediate object, it will be enough to mention the difference in the form of the metathorax, which in the genuine Proctotrupidæ is prolonged beyond the insertion of the hind coxæ in an attenuated process, while in the Diapridæ it terminates rather abruptly behind the sockets of these. The singular structure also of the Ovipositor (the Spicula seemingly coalescing with the Calamus), which I detected in Proctotrupes, and have described elsewhere ("Hymenoptera Britannica Oxyura," p. 7; H. Baillière: London, 1839), has not occurred among the Diapridæ, the composition of it being as usual, even in the remarkable insect which forms the more especial subject of the present Note. To the description of this I prefix a slight summary of the chief indigenous groups of the family, for the sake of exhibiting the essential characters of this genus more distinctly by comparison. At some future time I may perhaps be permitted to lay before this Association some other illustrations of the native species, at greater length than I can venture to encroach on your attention at present.

Of this family, Diapridæ, in the British Fauna, five principal groups have been established,—*Helorus*, *Ismarus*, *Belita*, *Diapria*, *Platymischus*,—most of them requiring some further subdivision, especially the fourth, the more numerous species of which have already afforded several dismemberments, which may hereafter prove actually entitled to generic rank,—*Paramesius*, *Spilomicrus*, *Basalys*, *Aneurrhynchus*, Westwood, and *Galesus* n. To those first five, which I have recognised as established genera, it is proposed here to add another, co-ordinate in character, though limited as yet, in its contents, to one known species.

Fam. Diapridæ.

Tibiæ anticæ calcari unico, posteriores binis. Antennæ articulis 12, superque. Mandibulæ dentatæ. Metathorax coxarum posticarum insertionem parum superans. Abdomen segmento primo petiolum fingente, secundo amplissimo.

Very little is known of the early states of the insects of this family; the few whose history has been traced are mostly parasites in the larvæ of Coleoptera and Diptera. Not a single species is to be found described in any of the works of Linnæus, who would doubtless have ranked them among his *Ichneumones minuti*.

Generum Synopsis.

Ungues
- pectinati. . . . . 1. HELORUS.
- integrae: Antennæ
  - prope epistoma insertæ. . . . . 2. ISMARUS.
  - ab epistomate distantes: Palpi maxillares
    - 5-articulati malâ longiores: Labiales
      - 3-articulati. . . . . 3. BELITA.
      - 2-articulati. . . . . 4. DIAPRIA.
    - 3-articulati malâ breviores. . . . . 5. PLATYMISCHUS.
    - obsoleti. . . . . 6. LABOLIPS.

Genus 1. HELORUS Latreille.

Antennæ 15-articulatæ, filiformes, porrectæ, in utroque sexu. Alæ anticæ areolis etiam mediis et stigmate. Ungues pectinati.

Palpi maxillares 5-articulati, labiales 3-articulati. Mandibula utraque intus bidentata. Labrum angustissimum, lineare. Alarum anticarum areola radialis 1, cubitales 2, discales 2, brachiales 2. Metathorax obtusus. Abdomen apice incurvum.

1. **coruscus**: niger, antennis subtus pedibusque testaceis, femoribus posticis infuscatis, scutello medio lævigato, pterostigmate subtrigono: *mas.*

Sequente gracilior; petiolus longior, subcylindriacus; prothoracis latera media lævigata; pterostigma latius. Vena recurrens disci posterior apice subarcuata.

Not nearly so common in England as the following species. I have found both species in Westphalia also.

2. **anomalipes** Pz.: niger, tibiis tarsisque anticis vel omnibus testaceis, scutello ubique punctato, pterostigmate lanceolato: *m. f.*

Abdominis petiolus basi incrassatus. Vena recurrens disci posterior recta obliquata. Vertex punctatus. Scutellum rudè punctatum, 'margine crenatum.

Sufficiently common in some parts of England and Ireland.

A third species, larger than either of the two preceding, taken near Aix-la-Chapelle, is in the collection of Mr. A. Förster of that city. If Jurine's figure is correct, we have represented in it a *fourth* European species of this genus,—*H. ater:* totus niger, areola cubitali interiore semi-divisa.

Genus 2. ISMARUS Hal.

Antennæ prope epistoma insertæ, filiformes, scapo vix frontis altitudine; maris 14-articulatæ, articulo tertio integro; feminæ 15-articulatæ. Mandibula bicuspis. Alæ anticæ areola radiali parva et brachiali unica. Mesonoti scutum æquatum.

Labrum transversum. Palpi labiales 3-articulati. Metathorax brevissimus. Abdomen apice incurvum.

Subgenus 1. ISMARUS.

Palpi maxillares 4-articulati. Petiolus longior quam latior.

1. **dorsiger** Curtis B. E. (*Cinetus*) 380,—*neesii* Förster,—*Belyta anomala* Nees: abdominis petiolo oblongo, apico attenuato, segmenti

secundi sulco quadrantali;—niger pruinosus, antennis basi squamulis pedibusque flavis: *mas*;—silaceus subdiaphanus, oculis ocellis thoracisque dorso medio fuscis: *femina*.

Subgenus 2. ENTOMIUS Herrich-Schæffer.

Palpi maxillares 5-articulati. Petiolus latior quam longior, vel subæquidiameter.

2. **campanulatus** Herrich-Schæffer,—*halidaji* Förster: niger, squamulis pedibus antennarumque basi (*maris* subtus, *feminæ* undique) ferrugineis, scutello lævi, petiolo subquadrato.

3. **rugulosus** Förster: niger, femoribus tibiis tarsisque ferrugineis, scutello apice emarginato abdomineque scabriculis, petiolo oblato: *femina*.

Genus 3. BELITA Jurine.

Antennæ in fronte porrecta insertæ, ab epistomate distantes, scapo frontis altitudinem superante; maris 14-articulatæ, articulo tertio exciso, rarissime subintegro; feminæ 15-articulatæ, rarissime 14-articulatæ. Alæ anticæ areola radiali parva, rariûs subobsoleta, et brachiali unica. Mesonoti scutum bisulcum.

Mandibulæ impares, intus unidentatæ. Palpi maxillares 5-articulati, articulo tertio dilatato, labiales 3-articulati. Labrum transversum, margine rotundatum. Scutellum fovea basali, puncto laterali perforato vel fenestrato in pluribus. Metathorax cancellatus, apice truncatus aut emarginatus. Abdomen segmentis octo, ultimo excepto spiraculiferis, at nonnullis sæpe retractis in femina. Alæ nonnunquam brevissimæ vel fere obsoletæ.

Subgenus 1. ACORETUS n.

Mandibulæ decussatæ longiores falcatæ.

Belyta rufopetiolata Nees, and half a dozen British species more.

Subgenus 2. CINETUS.

Mandibulæ decussatæ breviores cultratæ. Abdominis segmenta nonulla in feminis abscondita.

Belyta petiolaris Nees, *Cinetus gracilipes* Curtis; etc., about ten British species in all.

Subgenus 3. BELITA.

Mandibulæ decussatæ breviores cultratæ. Abdominis segmenta octo, omnia conspicua.

Belyta bicolor Jurine; *B. sanguinolenta* Nees; *B. breviventris* H.-Schæffer; and many more British species. *Cinetus armatus* Curtis,—*picipes* and *jurinei* Nees,—with the metathoracic scutellum elevated into a spine, and the base of the second abdominal segment surrounded by a beaded edge, may perhaps afford grounds for another subgenus to be detached from this. *B. heterocera*, with 14-jointed antennæ in the female, and the radial vein perpendicular and contracted into a dot, may possibly be considered as the type of yet another.

Subgenus 4. Opazon n.

Mandibulæ deflexæ rostriformes.

A single species, *B. parvula*, somewhat like a *Diapria*.

Genus 4. DIAPRIA Latreille,—*Psilus* Jurine.

Antennæ in fronte porrecta insertæ, ab epistomate distantes; maris 13-, vel 14-articulatæ, articulo tertio integro, quarto difformi; feminæ 12-, vel 13-articulatæ, apice crassiores. Palpi maxillares malâ longiores, 5-articulati; labiales 2-articulati. Alæ fere exareolatæ, aut nullæ. Mandibula intra apicem unidentata.

Synopsis of the Subgenera.

Antennæ of the male
- 13-jointed: of the female
  - 12-jointed. . . . . 7. Mionopria.
  - 13-jointed: base of second abdominal segment
    - channeled. . . . . 6. Glyphidopria.
    - smooth: petiole
      - covered at the tip by the base of the second segment, ... 4. Spilomicrus.
      - uncovered above and beneath equally. . . . 5. Paramesius.
- 14-jointed: of the female
  - 13-jointed. . . . . 1. Corynopria.
  - 12-jointed: base of second abdominal segment
    - smooth: subcostal vein
      - simple, ... 2. Diapria.
      - with a transverse branch before the end. . . 3. Basalys.
    - impressed: first joint of antennæ
      - angular. . . . . 9. Galesus.
      - linear. . . . . 8. Aneurhynchus.

Subgenus 1. Corynopria n.

Antennæ maris articulis 14, quarto integro; feminæ articulis 13, ultimo longe maximo. Alæ vena unica capitata. Abdominis segmentum secundum læve, summa basi leviter tomentosum.

1. **petiolaris** Nees,—*parvula* H.-Schæffer: nigra, pedibus ferrugineis, petiolo rufo-piceo membranâ crispa involuto;—antennis articulo primo longissimo, articulis flagelli ovatis: *mas;*—antennis ferrugineis, capitulo fusco articulis tribus, ultimo penultimum sextuplo superante: *femina.*

Alæ hyalinæ, vena humerali ferruginea, lineola transversa infumata hujus apicem transcurrente, aream basalem subglabram definiente; alæ maris apice sæpius leviter retusæ aut fere emarginatæ; in femina vix ita.

2. **cincta** n.: nigra, antennis basi pedibus petioloque villoso testaceis, antennis ferrugineis, articulo ultimo penultimum decuplo superante: *femina.*

Alæ totæ microscopicè pubescentes, apice rotundatæ, vena ferruginea, lineola sub ejus apice obsoletiore. Caput subglobosum.

Subgenus 2. Diapria Latr.

Antennæ maris articulis 14, quarto tuberculato; feminæ articulis 12. Alæ vena simplici capitata. Abdominis segmentum secundum læve. Metathorax subtruncatus.

Sectio 1. Abdominis segmentum secundum basi incisum.

Diapria conica Fb., femina,—mas, *D. rufipes* Latr.,—*D. spectabilis* Nees,—*D. filicornis* H.-Schæffer.

Sectio 2. Abdominis segmentum secundum basi integerrima.

Diapria verticillata Latr.,—*Psilus elegans* Jurine; *D. nigra* Nees,—*conica* Spinola; *D. fucicola* Walker,—*parvula* Nees; *D. picipes* Nees; *D. perelegans* Curtis,—*suspecta* Nees, etc.; in all about a dozen British species of this section.

Subgenus 3. Basalys Wwd.,—*Rhacodia* Herrich-Schæffer.

Antennæ maris articulis 14, quarto inæquali; feminæ 12, capitatæ. Vena quasi unica exiens in punctum stigmaticale appendiculatum, venulæ recurrentis vestigio ante apicem aucta. Abdominis segmentum secundum basi æquatum. Metathorax postice excavatus.

Six British species, including *Basalys fumipennis* Wwd.,—*Diapria striolata* Nees,—*Rhacodia id.* H.-Schæffer; *D. dispar* Nees, femina tantum, *Psilus antennatus* Jurine ?—mas, *Rhacodia picipes* H.-Schæffer; *Diapria rufiscapa* Nees,—*Rhacodia id.* H.-Schæffer.

Subgenus 4. Spilomicrus Wwd.,—*Chlidonia* spp. H.-Schæffer.

Antennæ 13-articulatæ; maris articulo tertio secundum plus duplo superante. Vena subcostalis concurrens cum costali in punctum stigmaticale appendiculatum. Abdominis segmentum secundum læve, superne retroproductum, petioli apicem imbricatim obtegens.

Spilomicrus stigmaticalis Wwd., — femina, *Chlidonia varipes* H.-Schæffer; in this species and *D. procera*, the costal vein is tolerably distinct; but fainter in the remaining four or five British species, as *Chlidonia radialis* and *obtusa* H.-Schæffer.

Subgenus 5. Paramesius Wwd.,—*Chlidonia* spp. H.-Schæffer.

Antennæ 13-articulatæ; maris articulis secundo et tertio minutis. Vena subcostalis cum costali concurrens in lineolam stigmaticalem cum ramulo radiali brevissimo. Abdominis segmentum secundum læve, basi supera et infera contermina.

Antennæ feminæ subclavatæ, articulo ultimo penultimum superante. Mesonoti scutum bisulcum; scutelli fovea in fundo crenata. Abdomen feminæ apice acuminatum.

Paramesius rufipes Wwd.,—*Diapria nervosa* Nees,—mas, *Chlidonia id.*,—femina, *Chl. acuminata* H.-Schæffer, a species that varies greatly in size and in the colour of the limbs.

Subgenus 6. Glyphidopria n.

Antennæ 13-articulatæ; maris articulo secundo minuto. Vena subcostalis qua marginem alæ attingit angulatim reflexa in ramulum radialem. Abdominis segmentum secundum basi media breviter canaliculatum.

1. **platyptera** n.: nigro-picea, petiolo (maris etiam thorace) rufescente, antennis basi et pedibus ferrugineis, alis apice emarginatis, mesonoto subtiliter bisulco, abdominis striola basali minutissima;—antennis corpore longioribus, articulis tertio et sequentibus subæqualibus: *mas;* —antennis corporis longitudine, articulis secundo et sequentibus subæqualibus: *femina.*

2. **perplexa** n.: nigra, antennis basi et pedibus ferrugineis, femoribus infuscatis, alis obtusis, venulæ brachialis recurrentis vestigio, mesonoti sulcis ante scutellum inchoatis;—antennis corporis longitudine, articulo tertio sequentibus paulo longiore, *mas;*—antennis corpore brevioribus apice incrassatis, articulis a tertio inde sensim curtescentibus et latescentibus: *femina.*

Subgenus 7. Mionopria n.

Antennæ maris 13-articulatæ; feminæ 12-articulatæ. Vena subcostalis cum costali concurrens in lineolam stigmaticalem medio appendiculatam. Abdominis segmentum secundum basi impressum. Mesonoti scutum bisulcum.

One British species, *Diapria maritima* n.

Subgenus 8. Aneurhynchus Wwd.

Antennæ maris 14-articulatæ; feminæ 12-articulatæ; scapo tereti. Vena subcostalis anastomosi libera transiens in radium, areolam radialem elongatam adumbrans. Abdominis segmentum secundum basi impressum.

A. galesiformis Wwd.,—*Diapria radialis* Nees; and three other British species.

Subgenus 9. Galesus Curtis,—*Coptera* Say.

Antennæ maris 14-articulatæ; feminæ 12-articulatæ; scapo oblique truncato angulato. Vena subcostalis libera, parum distincta, anastomosi punctiformi. Mandibulæ deflexæ, rostriformes, postice dentatæ. Abdominis segmentum secundum basi impressum.

Sectio 1. Antennæ maris articulo tertio minuto, quarto mediocri.

Galesus fuscipennis Curtis; *Psilus cornutus* Pz.,—*Diapria brunnipes* Nees; and three other British species.

Sectio 2. Antennæ maris articulis tertio quartoque minutis.

No British species of this section yet detected; I am acquainted with three German species, and one American. In some of these the fore-wings are deeply slit at the tip, as in that one Say has figured.

Genus 5. PLATYMISCHUS.

Palpi maxillares 3-articulati, malâ breviores; labiales obsoleti. Mandibula intra apicem unidentata. Antennæ in fronte porrecta insertæ, ab epistomate distantes; maris articulis 14, tertio emarginato; feminæ 12-articulatæ. Alæ fere exareolatæ, vel nullæ.

Subgenus 1. Platymischus Wwd.

Ocelli nulli, nec alæ. Antennæ maris scapo dilatato fornicato. Mala brevis dilatata. Mandibulæ adstrictæ, postice edentulæ. Prothoracis et mesothoracis segmenta penitus coalita. Scutellum basi efoveolatum. Abdominis petiolus incrassatus. Metatarsus anticus dilatatus, in mare fortiûs, cujus etiam intermedius aliquantum.

One British species, *Platymischus dilatatus* Wwd., common upon seaweeds drying on the shore.

Subgenus 2. Artibolus n.—*Chlidonia* spp. H.-Schæffer.

Ocelli tres. Mala atque ligula elongata membranaceæ. Mandibulæ deflexæ rostriformes, margine postico denticulato. Vena subcostalis exiens in lineolam stigmaticalem appendiculatam.

One species, *Diapria brachialis* Nees,—*Chlidonia uncinata* Herrich-Schæffer. Resembles a *Belita* in its general aspect; and the base of the second segment of the abdomen, in the female, is gibbous beneath, as in some species of that genus. The form of the mandibles, on the other hand, is more like that of the *Diapriæ* which constitute the subgenus *Galesus*.

Genus 6. LABOLIPS n.

Antennæ (feminæ) in fronte porrecta insertæ, 12-articulatæ. Mala atque ligula retractæ. Palpi maxillares obsoleti; labiales minuti exarticulati. Alæ fere aveniæ.

Ocelli tres. Mandibula intra apicem unidentata. Antennæ scapo elongato, flagello perfoliato. Abdominis segmentum secundum basi excavatum.

1. Labolips innupta n. Plate X.

Length 2 lines, antennæ $1\frac{1}{4}$, spread of wings $2\frac{1}{4}$.

Black, shining, abdomen pitchy, with ferruginous tip. Antennæ dusky-ferruginous, with blackish scape. Legs and squamulæ ferruginous, coxæ darker. Wings with a smoky tinge. Head subglobose, a little longer than broad, from the bilobed protuberance of the front, which bears the antennæ. Eyes rather small, protuberant, hairy. Ocelli 3 in a triangle, Parts of the mouth ferruginous, not prominent, the palpi not visible externally. Mandibulæ forcipate, stout, bidentate at the tip. Labrum transverse, the margin rounded. Maxillæ oblong, the tip rounded without a distinct mala or any trace of palpus. Labium stout, obconic, a little retuse at the tip; with a pair of palpi, distant at their insertion, and very short, consisting of a single obovate joint, crowned with two fine hairs. Peristoma produced into a curved spine-like process at each side. Antennæ as long as the head and thorax nearly; the scape cylindric, composing about $\frac{1}{3}$ of the entire length; the second and third joints obovate; the following ones oblate, perfoliate, and gradually increasing in both diameters towards the end; the last joint as long as the preceding two together, rounded at the tip. Thorax oblong, depressed, and rather flat on the back; prothorax coarsely punctured, attenuated into a neck; mesothorax smooth above; the scutum with

two sulci, which are curved in front and abbreviated behind; scutellum transverse-subquadrate, smooth, the arched basal suture dividing it from the short axillæ (which are nearly confluent in the middle), and the straight posterior one, crenate; scutellum of metathorax transverse-linear, punctured; the rest of metathorax coarsely punctured, the apex truncated, with the angles a little prominent; the pleuræ rugose-punctate, but smooth under the wings. Legs ferruginous, coxæ darker. Femora stout, subclavate. Fore tibiæ clavate; the spur curved, nearly as long as metatarsus, the tip incised, the inner point longer. Fore tarsus a little longer than the tibia; metatarsus as long as the following three joints together, curved; the strigil dense, gradually diminishing to the end of the joint; the following three joints subovate, gradually shortened; the last joint (with the simple curved claws) as long as the first. Posterior tibia straight, slightly clavate. Tarsus about as long as tibia, ratio of joints 5, 1, 2, 3, 4. Squamulæ ample. Wings pubescent, narrow, with a simple vein at the base, soon becoming obsolete; under this, in the fore wing, is a narrow triangular space, marked out by cloudy lines; in the outer region of the wing is an insulated longitudinal glabrous streak or spurious vein, placed rather nearest to the hinder margin. Lower wings very narrow, with three hamuli. Abdomen nearly as long and broad as thorax, spatulate, moderately convex, of six segments. Petiole rather longer than broad, rugose-punctate, with some longitudinal elevated lines, the base truncated, with a definite annular edge; the apex rounded, attenuated, received in a deep excavation of the following segment; rest of abdomen obovate; the third, fourth, and fifth segments very short, linear-transverse; the last semicircular, ending with a short deflected tube, composed of the exserted part of the valvulæ enclosing the ovipositor, the perforated apex of this surrounded with a whorl of fine hairs; under side of abdomen with some scattered hairs; the second segment with a faint oval fovea at each side of the base.

The ovipositor is retracted, except the little terminal tube, mentioned in the description already, but the parts clearly developed; the valvulæ linear, the exserted apex coloured, a little dilated, rounded, fringed with radiating hairs; the calamus tapering to a point, half as long as the spicula, which are strongly recurved inwardly. The ovaries form each an oblate spheroid, entirely covered with regular small protuberances, as if they were composed of an agglomeration of globular cells; the separate oviducts, in the short axis of the ovary, of considerable volume, and nearly as long as the transverse diameter of the ovary, united into a short common excretory canal. No seminal receptacle discovered. The alimentary canal presents nothing very peculiar; as usual in this family, it is short in proportion to the diameter; in both the specimens examined there appears to be a malformation of the Malpighian vessels, so that I could not determine the number of them with absolute certainty, but I suppose it to be five.

When the ovaries were crushed, a multitude of oblong-oval, nucleated vesicles (or eggs?) escaped, all apparently in an equal stage of development, and completely detached. The form of the ovaries themselves is without a parallel among the rest of the Hymenoptera, as far as I know. The most anomalous structure among these is that of Chelonus, as described and figured by Dufour (Anatomie des Orthopteres, &c.); but this has no resemblance to the structure observed in Labolips. The absence of a seminal receptacle in this insect, if the observation could be depended on as exact, would be the more singular, as this appendage is found in form even in the agamous Cynipidæ.

Found not uncommon, in autumn (but females only), in a field laid down in grass after a corn crop. The exact locality, a field adjoining the rere of the kitchen-garden of a country house called Clifden, in the townland of Knocknagoney, between Belfast and Holywood, and about a quarter of a mile from the main road between these towns, along a by-road leading up to Knocknagoney National School-house. I have not met with the species elsewhere, nor seen it in any other collection, except as derived from the same source; neither was it previously known to any of the correspondents to whom I have communicated specimens.

J. R. Greene, Hon. Sec., read a paper—

ON THE ACALEPHÆ OF THE DUBLIN COAST; BEING PART I. OF A SERIES OF "NOTES ON MARINE ZOOLOGY."

The following is a list of the Acalephæ hitherto observed by me on the Dublin coast. They have all been taken in Kingstown harbour during the summer of 1856. They may be thus arranged:—

1. Physograda.

Agalmopsis elegans.

2. Ciliograda.

Cydippe pomiformis.
Cydippe pileus.
Beroe ovata.
Mnemia Norvegica.

3. Discophora.

ORDER I.—STEGANOPHTHALMATA.

Aurelia aurita.
Aurelia campanulata.
Cyanea capillata.
Cyanea Lamarckii.
Rhizostoma pulmo.

ORDER II.—GYMNOPHTHALMATA.

Geryonopsis delicatula.
Thaumantias lucifera.
Thaumantias Thompsoni.
Thaumantias inconspicua.
Sarsia tubulosa.
Bougainvillia Brittanica.

It is not my object at present to enter into any details concerning the structure or habits of the Acalephs just mentioned.

With regard to *Agalmopsis elegans*, I may state that the species so named coincides in all respects with the figure and description of Sars (*Fauna littoralis Norvegiæ*). As to the Ciliograda (Ctenophoræ), *Cydippe pomiformis* and *C. pileus* were both abundant, as was also *Mnemia Norvegiæ*. For an interesting account of these three Ciliogrades I may refer you to Mr. Patterson's papers, published in the "Transactions of the Royal Irish Academy:" the last-mentioned animal is by him described under the name of *Bolina Hibernica*. I have frequently obtained specimens of it which were fully 2 inches in length; it is, however, a very fragile animal. *Beroe ovata* is much rarer than any of the preceding; I have in all taken but four specimens. Of the larger *Pulmograde Medusæ* (Steganophthalmata), both species of Cyanea occurred in great numbers during the months of July and August, as did also *Aurelia aurita*.

Aurelia campanulata was much rarer; and of *Rhizostoma pulmo*, so frequently mentioned in educational works on Zoology (where it is generally made the representative of its class), I have seen but one individual; this was of large size, measuring 15 inches in diameter.

Of the naked-eyed Medusæ above mentioned, *Sarsia tubulosa* was most abundant; it is also one of the most beautiful of our British Gymnophthalmata. *Thaumantias Thompsoni* has been previously taken on the coast of Cornwall, and at Clifden, county of Galway. *Thaumantias lucifera* was very plentiful; this is (I believe) an addition to our Irish Fauna, as are also *Thaumantias inconspicua* and *Geryonopsis delicatula*. *Bougainvillia Britannica* is mentioned in Thompson's "Natural History of Ireland" (vol. x.), under the name of *Hippocrene Britannica*.

Other Acalephs were observed, but I have refrained from mentioning any save those which I had carefully examined and identified. No class of animals require more careful research than the present. Brief though the above list may seem, it contains three species not previously found on the Irish shores, and one (*Agalmopsis elegans*) which has not yet been recorded as British. This must serve as an apology for detaining you with these hasty and incomplete memoranda. During the summer of the present year (1857) I trust to pursue, more in earnest, the study of this highly interesting, but most neglected, group of animals.

Professor Harvey read a Paper on some new species of British Algæ (for which see Proceedings of May 15, 1857).

After which the Meeting adjourned.

FRIDAY EVENING, APRIL 17, 1857.

W. H. Harvey, M.D., V.P., in the Chair.

The Minutes of last General Meeting having been read by the Secretary, were approved of, and signed by the Chairman.

The Chairman then announced to the Members the much lamented decease of their President, Robert Ball, LL. D.

The following Resolution was proposed by A. H. Haliday, A.M., V.P., and seconded by G. F. Shaw, LL. D., F.T.C.D., and passed unanimously:—

"That in consequence of the melancholy event just communicated to us by Professor Harvey, this Meeting do at once adjourn, without proceeding to the transaction of any business."

The Meeting accordingly adjourned to the 15th of May next.

FRIDAY EVENING, MAY 15, 1857.

W. H. Harvey, M. D., V. P., in the Chair.

The Minutes of last Meeting having been signed by the Chairman, the Secretary announced that a Library Fund had been opened, to enable

the Librarian to purchase some books at the auction of their late President's library. That a sum of £10 10*s*. had been received; and several very important works obtained: among others, De Blainville's "Manuel d'Actinologie ou de Zoophytologie," 2 vols.; and "De Malacologie, et des Conchyliologie," 2 vols.; Schlegel, "Essai sur les Serpens," with 4to atlas; Balfour's "Botany;" &c. &c.

A. H. Haliday, A.M., V.P., read a paper, accompanied with figures—

ON SOME REMAINING BLANKS IN THE NATURAL HISTORY OF THE NATIVE DIPTERA.

The natural history of the Diptera, in particular, as I understand it, is the history of the changes through which they pass, and the manner of life of the larva. Arrived at the perfect state, the winged insect is usually content with light nourishment, such as the nectar drops from the chalice of a flower, the golden dust of the anthers, or the honey-dew with which the leaves are besmeared by colonies of Aphides. Some tribes, indeed, make an exception to this general rule, preying on their weaker kindred with carnivorous appetite, or assailing the larger animals, and man himself, to drain their blood with keen though tiny lancets. But the majority, in this stage of their existence, give themselves either to the offices of parentage, as the selection of a proper nidus for their eggs, or to the delights of aërial dances, now associated in the full refulgence of the midday sun, now under the shadow of the forest canopy, suspended over the liquid mirror of the pool, or towering high, in spiral columns, above the summits of the tallest trees, when the lengthening shadows are beginning to invite the cool dews of twilight to descend and refresh the earth again. Far different is the history of that protracted period during which the wingless, legless, wormlike progeny has played its obscure but not unimportant part, unconscious of the more brilliant sphere of life for which it is growing up. Various and widely dissimilar are the situations in which those 'grubs' and 'maggots' obtain, consume, and assimilate the aliment, which is to furnish materials for the sinewy muscles and burnished armour, the legs and wings, and the ample and complex eyes of the two-winged fly. But their office in the economy of Nature is no trivial one, and they are fitted to fulfil it by their exceeding fecundity, voracity, and rapidity of growth in general. Linnæus has said—and it is, perhaps, scarcely an exaggeration—that a couple of flesh-flies will dispose of a bullock as quickly as a single lion could devour the same. In that case and in many others, the part assigned to this order, above all other insects, seems to be that of the scavengers of Nature; in which capacity, if in some minor instances troublesome to man, they are, to an extent almost incalculable, conducive to the salubrity and purity of the air he breathes, and the soil he treads on; however unobservant, in most cases, he may be of the agents or their benefits, or only conscious of disgust when they are forced upon his notice. Many other kinds, however, appear to work

him injury, decimating his most precious crops, or deforming the produce of the orchard and the garden.

Apart from its Economical bearing, the history of the development of the Diptera has a further interest, as it exemplifies nearly the most complete type of metamorphosis among the insect race, whether the change of habits, or of form, be considered, with all the new organs and faculties finally acquired, and the death-like slumber,—coffined, as it were, in many instances, in the spoils of the gross body that existed before that change, the last but one,—awaiting the moment when the imprisoned tenant, ripe for new life, shall burst from its cerements, to taste the freshness of a purer air, and revel in the untried delights of a higher existence.

If enough has been ascertained of the transformations of the Diptera, to afford such a general sketch of the aspect in which it meets our observation, yet we know too little, as yet, to satisfy either the purposes of System, or the requisitions of Natural History in its larger sense. The caterpillars of the Lepidoptera live comparatively in public; even the minute, hidden leaf-miners have been drawn out to light, for the sake of their great relations, or for the beauty of their own last, perfect garb. The Ephemera, the Mayflies, the Dragonflies, have early found their historian. More slowly and laboriously the materials have been accumulated for a history of Coleopterous larvæ also, which Chapuis and Candéze have condensed and methodized in their useful Catalogue; while we are yet far indeed from the prospect of a similar acquisition to the study of the Diptera. That minimum development of specific organs of sense or motion, which characterizes the larvæ of this order generally, seems to narrow the base on which a systematic arrangement of them may be reared; and their most conspicuous outward differences of general form and peculiar appendages stand in a more intimate relation to the particular mode of life and medium of habitation, than to the zoological characters which determine the systematic place of the perfect insect. A closer study will doubtless guide us hereafter to the appreciation of other external marks of distinction and affinity, at present overlooked or not understood. Still it seems probable that, for a long time, we shall not be able to dispense with considerations of the internal anatomy and physiological functions in the characteristic and arrangement of the Dipterous larvæ. In the list I have compiled of British species, the earlier history of which is known in some degree (with other European species which may serve to illustrate the indigenous genera), I have aspired to nothing more than to furnish an index, carried forward by additions subsequent to the date of Mr. Westwood's "Modern Classification of Insects," but without the aid of descriptions and figures, such as he has given in that very useful work,—a collection which is indeed indispensable to the student of the Diptera, as I know of no other work in which he can look, with any hope of satisfaction, for similar condensed and digested information. Much less shall I attempt to follow the precedent of the excellent "Catalogue of Coleopterous Larvæ" above referred to, by extracting the full descriptions, or the essence of them, from the best

authorities. My object has not been to compile even a complete list of references, but to select such as would be most practically useful, by their intrinsic completeness and accuracy, or as supplemental to one another, paying, in most instances, so much deference to the earliest observers as to cite them,—except when their accounts were so vague as to be quite insignificant,—even though they may have been since almost superseded by more recent and complete observations. As to classification and description, I have gone no further than, following Bouché, to indicate under each family, in a general way, the few broad characters which seem to distribute the larvæ into their primary large groups. These characters are partly drawn from the disposition of the Respiratory system,—the Spiracles being either distributed one at each side of several of the intermediate segments also (Peripneustic),—or limited to the pair of anterior openings in the first segment after the head, and another terminal pair frequently compound (Amphipneustic), —or finally, these last alone remaining (Metapneustic). Next in importance to this we consider the development of a distinct Head, strengthened by a horny integument, affording a fulcrum for strong muscles which move biting or grinding jaws (Eucephalous);—while in a great number the head, or first segment, differs from the following segments not by texture, but merely by its terminal position, and as the seat of the antennæ and organs of the mouth; the jaws, in this case, being usually metamorphosed into hooks, with long internal roots, having an alternate motion, and mutually parallel (Acephalous). Such an imperfect head is usually capable of being wholly withdrawn and concealed within the following segments, whence Bouché has applied to this last description generally the term "Leech-like." Finally, we admit a character of a different nature, and which we may be able to dispense with hereafter, when the organization of the larvæ shall have been more closely studied, and comes to be better understood; that is the circumstance, that in many instances the skin of the larva is not cast, but contracted and hardened into a case to protect the included pupa (Obtected); while in other instances, as is usual in most orders of insects, the larva-skin splits and shrivels up, the pupa being stripped either partially or completely (Extricated). The spines and other processes found in certain larvæ—those being the most remarkable which are subservient to the peculiar economy of the aquatic kinds—appear to be of a slighter systematic moment than the other characters we have specified; and even the presence of eyes, rare and almost exceptional as it seems to be among the larvæ of this order, has not afforded any clue but what is also deducible, simultaneously, from other more obvious appearances.

For the references to authorities compiled in the following list, I have adopted the same abbreviations, in general, as Mr. Walker has employed in his "Insecta Britannica Diptera," as that work will be almost necessarily in the hands of all who study this order in our own country; but for the sake of beginners who may not possess the book, I have subjoined the explanation of such references as I have had occa-

sion to use abbreviated, as this may tend to the convenience of the reader, without adding much to the bulk of the list:—

LIST OF THE GENERA AND SPECIES OF BRITISH DIPTERA, THE EARLIER STAGES OF WHICH ARE MORE OR LESS PERFECTLY KNOWN, WITH REFERENCES TO THE PRINCIPAL AUTHORITIES.

N. B.—The genera and species known as British are in capitals; the other European species introduced into this list, for illustration, in default of indigenous examples, are in Italics; as are also the Synonyms and Subgenera.

Fam. i. PULICIDÆ. Larva of thirteen segments, peripneustic, eucephalous, sanguisugous. Pupa extricated, commonly folliculate.

PULEX, (B. D. iv. 1.) Cestoni, Philosophical Transactions, 1699. Rsl., Ins. B. ii. Dg., M. vii. Wwd., G. Chr. 1848. Hal., N. H. R. 1855.

Fam. ii. MYCETOPHILIDÆ. Larva peripneustic,* eucephalous, vermiform; fungivorous or saprophagous. Pupa extricated, often folliculate.

BOLITOPHILA FUSCA, (B. D. iv. 71.) Grn., A. S. N. x. 1827. Df., (*M. hybrida*) A. S. N. xii. 1839.

MYCETOBIA PALLIPES, (B. D. iv. 50.) Lyonnet, O. P. Pl. xvii. f. 20, etc. Df., A. S. E. F. vii. 1849.

DITOMYIA FASCIATA, (B. D. iv. 63.) Mg., Zw. i. Wz. (*trifasciata,*) E. Z. 1846. PLESIASTINA *boleti*, Klt., A. N. H. ii. 1848.

Ceroplatus tipuloides, Df., A. S. N. xi. 1839. *C. sesioides*, Wlbg., A. Holm. 1848. See Rm., M. v.

PLATYURA MARGINATA, (B. D. iv. 64.) Mg., Zw. i. P. LATICORNIS, (B. D. iv. 65.) Schil., V. Schl. G. 1837.

ASINDULUM FLAVUM, (B. D. iv. 47.) Wz., (*Macrorrhyncha id.*) E. Z. vii. 1846.

CORDYLA (B. D. iv. 24.) CRASSICORNIS, Df., A. S. N. xii. 1839. *C. fusca*, Br., Isis 1846.

SCIOPHILA MARGINATA, (B. D. iv. 36.) Roser, W. Zw. *S. melanocephala*, Df., A. S. N. xii. 1839. *S. unimaculata, striata*, Per., A. S. E. F. vii. 1849.

TETRAGONEURA HIRTA, (B. D. iv. 44.) Wz., E. Z. 1846.

LEJA (B. D. iv. 26) *fasciata*, Roser, W. Zw.

MYCETOPHILA LUNATA, (B. D. iv. 13.) Hg., Sb. W. A. vii. 1851. M. ARCUATA, etc. Df., A. S. N. xii. 1839. *M. scatophora, lycogalæ*, Per., A. S. E. F. viii. 1839, vii. 1849. See also, Rm., M. iv. Dg., M. vi. Mg., Zw. i. Bou., Ng. Stn., Isis 1830. Br., Isis 1846. Roser, W. Zw. Scholz, S. E. Z. 1849.

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* According to Dufour, the larva of *Mycetobia pallipes* is amphipneustic. Although the larva has been noticed by other observers also, we have no means of either confirming or refuting this statement.

Sciara vitripennis, (B. D. iv. 53.) Bou., Ng. S. thomæ (B. D. iv. 52.) Berthold, D. N. H. Z. i. 1846. S. fuscipes (B. D. iv. 52.) Hg., Sb. W. A. xi. 1853. S. fucata, (B. D. iv. 54) Ct., G. Chr. 1845. See also, Mg., Zw. i. Olivier, Memoire etc. 1813. Schilling, V. Schl. G. 1831. Df., A. S. N. xii. 1839. Lw., E. Z. 1843. Mærkel, Grm. Z. E. v. 1844. Gim., A. N. V. Riga, i. 1847. Kollar, Schædl. Ins. Scholz, S. E. Z. 1849.

Fam. iii. CECIDOMYZIDÆ. Larva peripneustic,* acephalous,† phytophagous, mostly enclosed in galls of plants. Pupa extricated, sometimes folliculate.

Cecidomyia tritici, (B. D. iv. 103.) Kby., Linn. S. Tr. iv., v. Wwd., G. Chr. 1847. C. urticæ, (B. D. iv. 89.) Per., A. S. E. F. ix. 1840. C. *entomophila*, Per., M. S. Liége, x. 1855. See also, Dg., M. vi. Vallot, A. S. N. 1833. Bou., Ng.—E. Z. 1847. Mcq., D. N. F. Gené, Memorie del l'Accademia di Torino: xxxvi. Df., A. S. E. F. vi. 1837.—vii. 1838.—A. S. N. xvi. 18. Boje, Kr. N. H. T. ii. 1838. Lw., D. N. H. Z. ii. 1847. Rzbg., F. I. iii. Roser, W. Zw. Ct., G. Chr. 1845. Hardy, A. N. H. vi. 1849. Harris, Insects of Massachusetts. Fitch, A. J. A. 1847. But more especially Br., M. N. S. H. ix. 1847. Lw., D. Btr. iv. 1850. Wz., L. E. viii. 1853.

Lasioptera rubi, (B. D. iv. 133.) Hg., Sb. W. A. vii. 1851. L. arundinis, Hg., Sb. W. A. xx. 1856. See also, Df., A. S. N. xvi. 1851. Lw., E. Z. 1843. Kollar, Sb. W. A. 1849. Passerini, Acta Nova Academiæ Scientiarum Bononiensis: 1850. Lw., D. Btr. iv. Wz., Linn. Ent. viii. 1853.

Fam. iv. BIBIONIDÆ. Larva peripneustic,‡ eucephalous, often spiny, rhizophagous or saprophagous. Pupa extricated.

Penthetria holosericea, Zlr., Isis: 1842.

Dilophus spinatus, (B. D. iv. 140.) Ct., G. Chr. 1844. D. femoratus, (B. D. iv. 140.) Schleck, Isis 1838. Büttner, Grm. M. iv. 1821.

Bibio hortulanus, (B. D. iv. 136.) Bou., Ng. B. marci, (B. D. iv. 136.) Hg., Sb. W. A. ix. 1852. See also Rm., M. iv., v. Dg., M. vi. Rsl., Ins. B. ii. Lyonnet, O. P. Ct., G. Chr.

Scatopse notata, (B. D. iv. 141.) Bou., Ng. Df., A. S. N. vi. 1846. Per., A. S. E. F. v. 1847. Ct., J. R. A. S. x. 1850.

Fam. v. SIMULIDÆ. Larva amphipneustic, eucephalous, appendiculate, aquatic, predaceous. Pupa folliculate, appendiculate, fixed under water.

Simulia reptans, (B. D. iv. 147.) Verdat, Naturwissenschaftliche Anzeigen der Schweizerischen Gesellschaft, 1822. Fries, Observationes Entomologicæ, 1824. Kollar, Sb. W. A. 1848. Wwd., G. Chr. 1848.

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* According to both Dufour and Bouché, the larvæ of certain species of *Cecidomyia* present the anomaly of spiracles in the third and fourth segments also.

† According to Dufour, the larva of *Lasioptera* should be eucephalous.

‡ According to both Dufour and Perris, the larva of *Scatopse* is amphipneustic, while Bouché attributes to it the normal distribution of spiracles.

Fam. vi. CHIRONONOMIDÆ. Larva amphipneustic, eucephalous, usually aquatic and appendiculate, sometimes entomostraciform. Pupa extricated, free, floating, or folliculate.

Ceratopogon bipunctatus, (B. D. iv. 210.) Grn., A. S. E. F. ii. 1833. Df. A. S. E. F. iii. 1845. Lw., E. Z. 1843. C. varius, Hg., Sb. W. A. xx. 1856. See also, Bou., Ng. Per. A. S. E. F. v. 1847. Scholz, S. E. Z. 1849.

Tanypus monilis, (B. D. iv. 202.) Dg., M. vi. T. varius, (B. D. iv. 199.) Fries, Monographia Tanypodum Sueciæ. T. plumipes, (B. D. iv. 202.) Mg., Zw. i. See also Lyonnet, O. P. Pl. xvii. f. 1, etc.

Chironomus plumosus, (B. D. iv. 171.) Rm., M. iv. v. C. stercorarius, (B. D. iv. 186.) Dg. M. vi. Diamesa *culicoides*, Hg., Sb. W. A. x. 1853. *Hydrobaenus lugabris*, (B. D. iv. 193.) Fries, A. Holm. 1829. See also Br., Isis: 1846. Ellenberger, Lotos: 1851.

Fam. vii. CULICIDÆ. Larva amphipneustic, eucephalous, aquatic, appendiculate, entomostraciform. Pupa extricated, floating.

Corethra culiciformis, (B. D. iv. 251.) Rm., M. v. Lyonnet, O. P. pl. vii. fig. 3, etc.

Culex ciliaris, (B. D. iv. 247.) Rm., M. iv. Swam., B. N. Dg., M. vi.

Anopheles bifurcatus, (B. D. iv. 249.) Fischer, M. S. N. Mosq. iv. 1813.

Fam. viii. PHLEBOTOMIDÆ. Larva amphipneustic, eucephaous, saprophagous, often sub-aquatic. Pupa extricated.

Psychoda sexpunctata, B. D. iv. 255. Bou., (*phalænoides*) Ng. P. phalænoides,* B. D. iv. 255. Ct., (*nervosa*) J. R. A. S. x. 1850.

Pericoma nubila, B. D. iv. 254, 260. P. palustris, (B. D. iv. 259.) Roser, W. Zw. Scholz, S. E. Z. 1849. *P. humeralis*, Gim., A. N. H. V. Riga: i. 1847.

Ulomyia hirta, B. D. iv. 254, 261.

Fam. ix. HETEROCLITÆ. Larva (amphipneustic?) eucephalous, aquatic. Pupa extricated.

Dixa (B. D. v. 266) nigra, Stg., Kr. N. H. T. iv. 1842.

Fam. x. TIPULIDÆ. Larva metapneustic or amphipneustic, eucephalous, phytophagous, saprophagous, sometimes aquatic. Pupa extricated.

Trichocera hyemalis, (B. D. iv. 271.) Ct., J. R. A. S. T. regelationis, (B. D. iv. 271.) Df., A. S. N. xiii. 1840. T. annulata, Df., ib. Per., A. S. E. F. vi. 1847.

Anisomera nigra, (B. D. iv. 272.) Roser, W. Zw.

Erioptera (B. D. iv. 273) Dg., M. vi. Pl. xxiv. f. 1–14.

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* Perris (A. S. N. xiii. 1840) has figured a larva, which undoubtedly belongs to some other family of Diptera, as that of *P. phalænoides*.

Limnobia bifasciata, (B. D. iv. 293, 342.) Schum., (*xanthoptera*) Schl. Btr. i. 1829. *L. clavata*, Br., Isis: 1842. L. annulus, Roser, W. Zw. *L. platyptera*, Hg., Sb. W. A. xi. 1853. *L. replicata*, Dg., M. vi.

Limnophila dispar, (B. D. iv. 286) Per., A. S. E. F. vii. 1849.

Ula pilosa, (B. D. iv. 308.) Schum., Schl. Btr. i. 1829. Per., (*macroptera*,) A. S. E. F. viii. 1849.

Cylindrotoma distinctissima, (B. D. iv. 313.) Boje, Kr. N. H. T. ii. 1838. Zlr., Isis: 1852.

Tipula oleracea, (B. D. iv. 325.) Ct., G. Chr. 1845. (*Pachyrrhina*) maculosa, Ct., J. R. A. S. vi. 1846. For other species, see Rm., M. v. Dg., M. vi. Rsl., Ins. B. ii. Bouché, Ng. Scholz, S. E. Z. 1849.

Nephrotoma, (B. D. iv. 316.) Br., Isis: 1846.

Ctenophora atrata, (B. D. iv. 336.) Rm., M. v. Per., A. S. N. xiv. 1840. Nördlinger, E. Z. ix. 1848. For other species, see Scholz, S. E. Z. 1850.

Ptychoptera fasciata, (B. D. iv. 339.) Rm., M. v. Lyonnet, O. P. Pl. xviii. f. 1–7.

Chionea araneoides, Brauer, V. Z. B. V. W. iv. 1854.

Fam. xi. RHYPHIDÆ. Larva amphipneustic, eucephalous, serpentiform, saprophagous. Pupa extricated.

Rhyphus fenestralis, (*cinctus*, B. D. iv. 341.) Rm., M. v. Df., A. S. E. F. vii. 1848. Bou., Ng. Grn., Iconographie du Regne Animal. R. nigricans, (B. D. iv. 341.) Ct., (*fuscatus*), G. Chr.

Fam. xii. STRATIOMYDÆ. Larva peripneustic, eucephalous, with distinct eyes, coriaceous, depressed, saprophagous, sometimes aquatic. Pupa obtected.

Stratiomys chamæleon, (B. D. i. 15.) Rm., M. iv. and for other references see Wwd., M. C. S. ii. S. ornata, (B. D. i. 17.) Rm., M. iv. S. argentata, (B. D. i. 17.) Zlr., Isis: 1842. S. hydroleon, (B. D. i. 19.) Dg., M. vi.

Oxycera, (B. D. i. 19.) Br., Isis: 1846. O. meigenii, O. trilineata, Hg., Sb. W. A. xx. 1856. O. morrisii, Hal., N. H. R. 1857.

Clitellaria ephippium, (B. D. i. 24.) Roser, W. Zw. Zlr., Isis: 1842. Märkel, Grm., Z. E. V. 1844.

Nemotelus uliginosus Hal., N. H. R. Proceedings of D. U. Zool. Botan. Association, 1857.

Pachygaster ater, (B. D. i. 27.) Carcel, E. M. x. Mcq., D. N. F. Df., A. S. N. xvi. 1841. Schilling, Schl. Btr. i. 1829. Hg., Sb. W. A. x. 1853.

Chrysomyia polita, (B. D. i. 28.) Roser, W. Zw.

Sargus cuprarius, (B. D. i. 30.) Lyonnet, O. P. Pl. xvii. f. 21, etc. Bou. Ng. S. bipunctatus, (B. D. i. 32.) Rm., M. iv. Pl. xxii. f. 5–8.

Fam. xiii. XYLOPHAGIDÆ. Larva amphipneustic, eucephalous. Pupa obtected.

Subula varia, (B. D. i. 34.) Roser, W. Zw. S. maculata, (B. D.

i. 34.) Wwd., M. C. I. ii. See also Wesmael, A. S. E. F. vi. 1837. Df., A. S. N. vii. 1847.

Xylophagus ater, (B. D. i. 33.) Drewsen, Kr. N. H. T. iv. 1842. Wwd., M. C. I. ii.

Fam. xiv. TABANIDÆ. Larva amphipneustic, eucephalous, saprophagous. Pupa extricated.

Tabanus bovinus, (B. D. i. 37.) Dg., M. vi. T. autumnalis, tropicus, (B. D. i. 37. 39.) Scholz, S. E. Z. 1849. *T. quadrinotatus*, Kollar, Sb. W. A. xiii. 1854.

Hæmatopota pluvialis, (B. D. i. 42.) Fb., S. E. Scholz, S. E. Z. 1849.

Chrysops cæcutiens, (B. D. i. 43.) Fb., S. E.

Fam. xv. ACROCERIDÆ. Transformation unknown. See, however, Gerstæcker, E. Z. 1856.

Fam. xvi. ASILIDÆ. Larva amphipneustic, eucephalous, thalerophagous. Pupa extricated.

Laphria, (B. D. i. 47.) Lucas, A. S. E. F. vi. 1848. Df., A. S. N. xiii. 1849. Zlr., Isis: 1842.

Asilus crabroniformis, (B. D. i. 55.) Frisch, Insekten Deutschlands. A. forcipatus, (B. D. i. 52.) Dg., M. vi. Df., A. S. N. xiii. 1850. A. germanicus, (B. D. i. 55.) Rzbg., F. I. iii. A. æstivus, (B. D. i. 51.) Harris, Exposition of English Insects.

Fam. xvii. LEPTIDÆ. Larva amphipneustic, eucephalous. Pupa extricated.

Leptis scolopacea, (B. D. i. 65.) Bou., Ng.

Atherix ibis, (B. D. i. 69.) Ent. Mag. iv. 1837.

Fam. xviii. BOMBYLIDÆ. Larva amphipneustic, eucephalous, entomobious. Pupa extricated.

Anthrax hottentotta, (B. D. i. 78.) Schæffer, Abhandlungen: ii. Wlbg., A. Holm. 1838. Mulsant, M. A. Lyon: ii. 1853. See also Dg., M. vi. Roser, W. Zw. Wwd., M. C. I. ii.

Bombylius, (B. D. i. 80.) Imhoff, Isis: 1834. Wwd., M. C. I. ii. Lucas, A. S. E. F. x. 1852.

Fam. xix. THEREVIDÆ. Larva amphipneustic, eucephalous, (serpentiform, with abdominal segments bisected,) saprophagous. Pupa extricated.

Thereva plebeja, (B. D. i. 76.) Frisch, Insecten Deutschlands. Bou., Ng. T. anilis, (B. D. i. 76.) Bou., Ng. *T. nobilitata*, Mg., Zw. ii.

Fam. xx. Scenopinidæ. Larva amphipneustic, eucephalous, serpentiform, saprophagous. Pupa extricated.

Scenopinus fenestralis, (B. D. i. 85.) Bou., Ng. Df., A. S. E. F. vii. 1849.

Fam. xxi. EMPIDÆ. Larva amphipneustic, eucephalous (?), saprophagous. Pupa extricated.

Empis opaca, (B. D. i. 91.) Mcq., D. N. F.
Rhamphomyia spinipes, (B. D. i. 109.) Bou., Ng.
Platypalpus, (B. D. i. 121.) Boje, in Scholz, S. E. Z. 1849.

Fam. xxii. DOLICHOPIDÆ. Larva amphipneustic, eucephalous, saprophagous. Pupa extricated.

Dolichopus æneus, (B. D. i. 59.) Dg., M. vi.
Rhaphium fascipes, (B. D. i. 203.) Hg., Sb. W. A. ix. 1852.

Fam. xxiii. LONCHOPTERIDÆ. Transformation unknown.

Fam. xxiv. PLATYPEZIDÆ. Larva amphipneustic, acephalous, fungivorous. Pupa obtected.

Platypeza boletina, (B. D. i. 225.) Roser, W. Zw. P. holosericea, (B. D. i. 227.) Df., A. S. N. xiii. 1840. P. furcata, (B. D. i. 225.) Ztt., D. S. p. 3199.

Fam. xxv. PIPUNCULIDÆ. Larva amphipneustic, acephalous, entomobious. Pupa obtected.

Pipunculus (B. D. i. 231.) *fuscipes*, Boh., Ofw. Sw. A. 1854.

Fam. xxvi. SYRPHIDÆ. Larva amphipneustic, acephalous; form and economy various. Pupa obtected.

Ceria conopsoides, (B. D. i. 238.) Roser, W. Zw. Df., A. S. E. F. v. 1847.
Microdon mutabilis, (B. D. i. 240.) Schottlauber, Isis: 1840. Elditt, E. Z. 1845. M. apiformis, (B. D. i. 240.) Wissman, E. Z. 1848.
Eumerus æneus, (B. D. i. 244.) Bou., Ng. Ct., G. Chr. 1842. E. strigatus, Bou., Ng.
Eristalis, (B. D. i. 242.) Rm., M. iv. Swam., B. N. Br., Isis: 1846. Ztt., D. S. p. 666.
Helophilus, (B. D. i. 247.) Rm., M. iv.
Merodon clavipes (B. D. i. 252.) Rm., M. iv. St. Fargeau, E. M. x. Bou., Ng. Ct., G. Chr. 1842. Roser, W. Zw.
Syritta pipiens, (B. D. i. 253.) Dg., M. vi.
Xylota (B. D. i. 254.) *florum*, Roser, W. Zw. *X. valgus*, Br., Isis: 1846.
Milesia (B. D. i. 256.) *vespiformis*, Mg., Zw. iii.
Criorrhina oxyacanthæ, (B. D. i. 259.) Roser, W. Zw. C. apicata, Schranck, (*apiformis*,) Enumeratio Insectorum Austriæ.
Volucella bombylans, (B. D. i. 261.) Rm., M. iv. Dg., M. vi. Boje, Kr. N. H. T. ii. 1838. V. inflata, (B. D. i. 261.) Br., Isis: 1846. V. inanis, (B. D. i. 261.) Schmitt, Isis: 1842. Ztt., D. S. p. 310. V. zonata, Rm., M. iv.
Chrysotoxum festivum, (B. D. i. 264.) Roser, (*arcuatum*,) W. Zw.

Brachyopa bicolor, (B. D. i. 277.) Df., A. S. N. ix. 1848. B. conica (B. D. i. 278.) Roser, W. Zw. *B. ferruginea*, Ztt., D. S. p. 686.

Rhingia rostrata, (B. D. i. 279.) Rm., M. iv.

Chilosia scutellata, (B. D. i. 283.) Df., A. S. N. xiii. 1840, ix. 1848. Roser, W. Zw. See also Boje, E. Z. xi. 1850. Per., A. S. E. F.

Syrphus pyrastri, (B. D. i. 287.) Rm., M. iii. Rzbg., F. I. iii. S. ribesii, (B. D. i. 287.) Dg., M. vi. S. balteatus, (B. D. i. 289.) Bou., Ng. Ztt., D. S. p. 3139. S. albostriatus, (B. D. i. 291.) Zlr., Isis: 1842. See also, for other references, Wwd., M. C. I. ii.

Doros conopseus, B. D. i. 297.) Br., Isis: 1846.

Fam. xxvii. CONOPIDÆ. Larva entomobious. Pupa obtected.

Conops quadrifasciatus, (B. D. i. 306.) Br., Isis: 1846. See also Latreille, Histoire Naturelle Generale et Particulière des Insectes. Audouin, Memoires de la Société d'Histoire Naturelle de Paris: i. 1823. Df., A. S. N. vii. 1837. Boh., Ofw. Sw. A. 1851. Kirschbaum, Jahrbücher des Vereines für Naturkunde im Herzogthum Nassau: ix. 1853.

Myopa, (B. D. ii. 4) Heyden, Isis: 1842. A. S. E. F. Bulletin: iv. 1856.

Fam. xxviii. MUSCIDÆ. Larva amphipneustic or metapneustic, acephalous; various in form and economy. Pupa obtected.

See the Rev. F. Hope's Memoir on Insects inhabiting the Human Body; in the Transactions of the Entomological Society of London, vol. ii.

Phasia (B. D. ii. 7.) *crassipennis*, Df., A. S. E. F. vi. 1848. *Hyalomyia dispar*, Df., A. S. E. F. ix. 1851, x. 1852.

Phania, (B. D. ii. 10.) Ztt., D. S. p. 1218.

Ocyptera (B. D. ii. 8.) *bicolor*, Df., A. S. N. x. 1827.

Gymnosoma rotundata, (B. D. ii. 11) Heyden, Amtliches Bericht, 1842.

Gonia capitata, (B. D. ii. 13.) Htg., F. J. B. ii. 1838. G. fasciata, (B. D. ii. 13.) Ztt., D. S. p. 3252.

Tachina grossa, (B. D. ii. 19.) Dg., M. vi. Krause, V. Schl. G. 1832. T. tessellata, (B. D. ii. 20) Boje, E. Z. 1848. T. viridis, (B. D. ii. 26.) Boje, Kr., N. H. T. ii. 1838. T. pacta (B. D. ii. 52.) Winthem, Isis: 1831. Boje, Kr. N. H. T. ii. 1838. T. concinnata, (B. D. ii. 88.) Bou., Ng. Rzbg., E. Z. viii. 1849. T. setipennis, (B. D. ii. 298.) Boh., Ofw. Sw. A. 1850. T. nitidula (B. D. ii. 298.) Smith, Tr. E. S. ii. 1852. *T. erinacea*, Ztt., D. S. p. 107. *T. flavoscutellata*, Ztt., D. S. p. 926. *T. inflexa*, Bou., Ng. See also Desv., Myod.—A. S. E. F. viii. 1849,—R. M. Z. 1851. Rzbg., F. I. iii. Htg., F. J. B. ii. 1838. Df., A. S. E. F. iii. 1845. Lambert, A. S. E. F. ix. 1851. Gim., B. S. N. Mosc. i. 1829. Lacaze-Duthiers, A. S. N. xix. 1853. Mcq., D. N. F. Verloren, in Brant, Tijdsschrift voor natuurkundige Wetenschappen: i. 1848. Siebold, A. N. G. i. 1838. Goureau, A. S. E. F. i. 1843. Wwd., M. C. I. ii.

Dexia nigripes, (B. D. ii. 96.) Scholz, S. E. Z. 1849. *D. leucozona*, Ztt., D. S. p. 1267.

Trixa, (B. D. ii. 100.) Desv., A. S. E. F. viii. 1850. Bulletin, p. ix.

Sarcophaga carnaria, (B. D. ii. 102). Bou., Ng. Fln., D. S. Ct., G. Chr. 1844. S. albiceps, (B. D. ii. 103.) Htg., F. J. B. ii. 1838. S. hæmorrhoidalis, (B. D. ii. 104.) Bou., Ng. Desv., A. S. E. F. vii. 1849, Bull. p. xviii. *S. quadrata*, Bou., Ng. *S. muscaria*, Per., M. S. Lille: 1851. See also Siebold, A. N. G. i. 1838.

Miltogramma punctata, Siebold, Observationes Entomologicæ, 1841. Ct., B. E. 529. M. œstracea, Ztt., D. S. p. 3254. M. conica, Siebold, Obs. Ent. ibid.

Musca cæsar, (B. D. ii. 111.) Dg., M. vi. Bou., Ng. M. corvina, (B. D. ii. 111.) Bou., Ng. M. maculata, (B. D. ii. 114.) Mg., Zw. iv. M. hortorum, (B. D. ii. 113.) Bou., Ng. *M. pascuorum*, Br., Isis: 1846. M. stabulans, (B. D. ii. 113.) Htg., F. J. B. ii. 1838. Df., A. S. N. xiii. 1840. Ct., J. R. A. S. x. 1850. M. assimilis, Df., (*fungivora*,) A. S. N. xiii. 1840.

Mesembrina meridiana, (B. D., ii. 115.) Dg., M. vi. M. mystacea, Dg., ib. Rm., M. iv.

Stomoxys calcitrans, (B. D. ii. 116.) Bou., Ng.

Anthomyia (B. D. ii. 117.) *Macrosoma* lardaria, (B. D. ii. 119.) Desv., Myod. *Hydrotæa* dentipes, (B. D. ii. 145.) Bou., Ng. H. armipes, (B. D. ii. 145.) Bou., Ng. H. meteorica, (B. D. ii. 145.) Sparmann, A. Holm. 1778. *Ophyra* leucostoma, (B. D. ii. 145.) Bou., Ng. *Homalomyia* scalaris, (B. D. ii. 1845.) Swamm., B. N. Bou., Ng. Ztt., D. S. p. 1575. H. manicata, (B. D. ii. 145.) Df., A. S. N. xiii. 1840. *H. paradoxalis* (monilis?) Df., ib. *H. melania*, Df., A. S. N. xii. 1839. H. canicularis, (B. D. ii. 136.) Bou., Ng. H. tuberosa, Ct., G. Chr. 1845. *Aricia* testacea, (B. D. ii. 125.) Df., A. S. N. xii. 1839. *Hylemyia* strigosa, (B. D. ii. 145.) Scholz, S. E. Z. 1849. *Pegomyia* bicolor, (B. D. ii. 146.) Ztt., D. S. p. 1774. P. hyoscyami, Ztt., D. S. p. 1792. P. solennis, (B. D. ii. 146.) Bou., (*rumicis*,) Ng. Boje, Kr. N. H. T. iii. 1841. Goureau, A. S. E. F. ix. 1851. Desv., R. M. Z. 1851. P. fulgens, (B. D. ii. 144.) Scholz, S. E. Z. 1849. *P. versicolor*, Br., Isis: 1846. P. betæ, Ct., J. R. A. S. viii. 1848. Scholz, S. E. Z. 1849. Goureau, (*atriplicis*,) A. S. E. F. 1851. Desv., R. M. Z. 1851. A. lactucæ, Bou., Ng. Kollar, (*lactucarum*,) Schädliche Insekten. A. varicolor, radicum, (B. D. ii. 137.) Scholz, E. S. Z. 1849. A. antiqua, (B. D. ii. 1845.) Bou., (*ceparum*,) Ng. Wwd., G. Chr. Ztt., D. S. p. 3297. A. platura, (B. D. ii. 145.) Goureau, A. S. E. F. vii. 1848. Bou., Ng. *A. strigata*, Scholz., S. E. Z. 1849. Ztt., D. S. p. 1655. A. gnava, Ct., J. R. A. S. viii. 1849. A. triangula, (B. D. ii. 145.) Roser, W. Zw. *A. albescens*, Ztt., D. S. p. 1521. A. riparia, Hal., N. H. R. 1857. And for other species see Bou., Ng. Mcq., A. S. E. F. i. 1853. Goureau, A. S. E. F. vii. 1848. Desv., R. M. Z. 1851. Htg., F. J. B. ii. 1838. Ztt., D. S.

Cœnosia tigrina, (B. D. ii. 132.) Bou., (*vaccarum*,) Ng. C. fungorum (B. D. ii. 143.) Mg., Zw. v. Wwd., G. Chr. 1853.

Lispe tentaculata, (B. D. ii. 147.) Bou., Ng. Desv., Myod. Scholz, S. E. Z. 1850.

Cordylura spinimana, (B. D. ii. 151.) Br., Isis: 1846. C. apicalis, Boje, Kr. N. H. T. ii. 1838.

Scatophaga stercoraria, (B. D. ii. 158.) Rm., M. iv. S. merdaria, B. D. ii. 154.) Bou., Ng. S. serotina, Per., A. S. E. F. viii. 1840.

Thyreophora cynophila, Desv., A. S. E. F. x. 1841. T. *anthropophaga*, Desv., Myod.

Sphærocera subsultans, (B. D. ii. 173.) Br., Isis: 1846.

Borborus equinus, (B. D. ii. 175.) Hal., Ent. Mag. iv. B. nitidus, (B. D. ii. 174.) Mcq., H. N. D. ii. *B. stercorarius*, Br., Isis: 1846.

Limosina limosa, (B. D. ii. 178.) Br., Isis: 1846. L. ochripes, (B. D. ii. 179.) Scholz, S. E. Z. 1850. *L. lugubris*, Df., A. S. N. xii. 1839. *L. salina*, Heyden, E. Z. 1848.

Heteroptera pusilla, (B. D. ii. 184.) Br., Isis: 1846.

Helomyza pallida, (B. D. ii. 162.) ustulata, Rm., M. iv. Lucas, A. S. E. F. vii. 1849. Df., A. S. N. xii. 1839. Desv., Myod.

Leria serrata, (B. D. ii. 162.) Bou., Ng. Df., A. S. N. xii. 1839.

Tetanocera ferruginea, (B. D. ii. 168.) Df., A. S. E. F. vii. 1849.

Dorycera graminum, (B. D. ii. 171.) Mg., Zw. v.

Lucina fasciata, (B. D. ii. 171.) Per., M. S. Lille: 1851.

Chyliza atriseta, (B. D. ii. 219.) Per., M. S. Lille, 1851. C. scutellata, (B. D. ii. 219.) Scholz, (*leptogaster*,) S. E. Z. 1849.

Psila rosæ (B. D. ii. 221.) Kollar, Schädliche Insekten. Ct., J. R. A. S. ix. 1850. P. nigricornis, Ct., Morton's Cyclopædia of Agriculture.

Platycephala umbraculata, (B. D. ii. 224.) Boje, Kr. N. H. T. ii. 1838.

Chlorops lineata, (B. D. ii. 228.) Grm., R. Z. 1844. Wwd., G. Chr. 1848. C. glabra, (B. D. ii. 228.) Wwd., G. Mag. xiii. C. tæniopus, (B. D. ii. 228.) Ct., G. Chr. 1846. Grm., M. S. R. A. 1842.

Lipara *lucens, similis*, Hg., Sb. W. A. xx. 1856. Per., M. S. Lille: 1851, (*Gymnopoda tomentosa*, et *Var.*)

Oscinis frit, (B. D. ii. 231.) Bjerkander, A. Holm. 1778. Ct., (*granaria, vastator*,) J. R. A. S. vi. 1846. O. nigerrima (B. D. ii. 231.) Goureau, A. S. E. F. iv. 1847.

Madiza *nucis*, Per., A. S. E. F. viii. 1839.

Piophila casei, (B. D. ii. 222) Swamm., B. N. Bou., Ng. Grm., E. Z. ii. 1841. P. luteata, (B. D. ii. 222.) Df., (*petasionis*,) A. S. N. i. 1844. P. apii, Wwd., G. Chr. 1848.

Dichæta caudata (B. D. ii. 251.) Br. Isis: 1846.

Notiphila (B. D. ii. 250.) Br., Isis: 1846. Ztt., D. S.

Psilopa, (B. D. iv. 324.) Ztt. D. S. p. 132.

Ephydra halophila, (B. D. iv. 346.) Heyden, E. Z. 1844. Diruf, E. Z. 1847.

Halmopota salinaria, (B. D. iv. 346.) Bou., Ng.

Tichomyza fusca (B. D. ii. 267.) Desv., (*urinaria*,) A. S. E. F. vi. 1847.

Aulacigaster rufitarsis, Df., A. S. E. F. iv. 1845.

Heteromyza flava, (B. D. ii. 163.) Boje, E. Z. 1847.

Heteroneura albimana, Boje, E. Z. 1847.

Opomyza gracilis, (B. D. ii. 239.) Per., M. S. Lille: 1851. Ztt., D. S. p. 3360.

Drosophila cellaris, (B. D. ii. 237.) Rm., M. v. Ct., B. E. 473. *D. aceti*, Hg., Sb. W. A. vii. 1851. *D. fasciata*, maculata, Df., A. S. N. xii. 1839. xiii. 1840. *D. pallipes*, Df., A. S. E. F. iv. 1846. *D. variegata*, Hg., Sb. W. A. ix. 1852. D. flaveola, Hg., Sb. W. A. ix. 1852. Per., A. S. E. F. ix. 1850. Hardy, (*apicalis*,) Proceedings of Berwickshire Naturalists' Club: 1849. D. graminum, (B. D. ii. 238.) Hardy, ibid.

Sapromyza obsoleta, (B. D. ii. 188.) Bou., Ng. S. 4-punctata, (B. D. ii. 190.) Per., A. S. E. F. ix. 1851. See also Rzbg., F. I. iii. Ztt., D. S. p. 3267.

Lonchæa chorea, (B. D. ii. 187.) Bou., Ng. L. nigra, (B. D. ii. 187.) Per., A. S. E. F. vii. 1849. *L. parvicornis*, Per., A. S. E. F. viii. 1840. *L. palposa*, Scholz, S. E. Z. 1850. *Teremyia laticornis*, Per., A. S. E. F. viii. 1840.

Milichia maculata, reared by Miss Knight from fungivorous larvæ; J. Curtis.

Leucopis punctricornis, (B. D. ii. 240.) Bou., Ng. L. obscura, (B. D. ii. 240.) Htg., (*griseola*,) F. J. B. ii. 1838. *L. albipennis*, Br., Isis: 1838. *L. annulipes*, Boh., A. Holm. 1848. *L. argentata*, Hg., Isis: 1848.

Gitona distigma, Lw., D. N. H. Z. ii. 1847.

Agromyza æneiventris, Rdn., A. S. E. F. iii. 1845. Nylander, Notitiæ pro Fauna et Flora Fennica: 1847. Scholz, S. E. Z. 1849, *A. lappæ*, Lw., E. Z. 1849. A. nigripes, (B. D. ii. 242.) Goureau. A. S. E. F. viii. 1850. A. ornata, B. D. ii. 243. A. violæ, Ct., G. Chr. 1844. See for other species, Bou., E. Z. 1847. Lw., E. Z. 1849. Goureau, A. S. E. F. viii. 1850. Klt., A. N. H. ii. 1848. Hardy, A. N. H. iv. 1850. Scholz, S. E. Z. 1850.

Phytomyza affinis, (B. D. ii. 246.) Boje, Kr. N. H. T. ii. 1838. P. obscurella, (B. D. ii. 245.) Goureau, A. S. E. F. iv. 1846. P. aquifolii, (B. D. ii. 245.) Desv., R. M. Z. 1851. P. flava, (B. D. ii. 247.) Doubleday, Ent. Mag. iv. 1837. P. flaviceps, Desv., R. M. Z. 1850. P. nigra, Hardy, A. N. H. iv. 1850. P. nigricornis, Ct., G. Chr. 1845. P. albiceps, Hg., Sb. W. A. ix. 1852. And for other species see Klt., A. N. H. ii. 1848. Goureau, A. S. E. F. viii. 1850. Desv., R. M. Z. 1851.

Tephritis cognata, (B. D. ii. 199.) Boje, Kr. N. H. T. ii. 1838. T. signata, (B. D. ii. 207.) Bach, E. Z. 1842. T. artemisiæ, (B. D. ii. 199.) Bou., E. Z., 1848. Wwd., M. C. I. ii. Roser, W. Zw. T. gædii, (B. D. ii. 198.) Boje, E. Z. 1848. Ztt., D. S. p. 3344. T. zoe, (B. D. ii. 200) Lw., E. Z. 1847. T. heraclei, (B. D. ii. 199.) Boje, E. Z. 1847. Ct., J. R. A. S. ix. 1850. T. parietina, (B. D. ii. 203.) Wissmann,

E. Z. 1848. T. WIEDEMANNII, (B. D. ii. 207.) Lw., D. N. H. Z. ii. 1847. T. CARDUI, (B. D. ii. 206.) Lw., ib. Wwd., G. Chr. 1847. T. STYLATA, SOLSTITIALIS, (B. D. ii. 205.) Boje, E. Z. 1848. T. WESTERMANNI, (B. D. ii. 207.) T. LEONTODONTIS, (B. D. ii. 204.) T. ARNICÆ, (B. D. ii. 201.) T. BARDANÆ, (B. D. ii. 204.) T. ARCTII, (B. D. ii. 205.) T. FLORESCENTIÆ, (B. D. ii. 201.) T. MARGINATA, (B. D. ii. 202.) T. ABSYNTHII, (B. D. ii. 202.) T. STELLATA, (B. D. ii. 204.) T. COLON, (B. D. ii. 207.) T. SERRATULÆ, (B. D. ii. 201.) T. SONCHI, (B. D. ii. 200.) T. SPOLIATA, (*stigma*,) Lw. D. N. H. Z. ii. 1847, which consult for the fullest information on the species in general. See also Scholz, S. E. Z. 1849. Swamm., B. N. Rm., M. iii. Dg., M. vi. Rosenhauer, E. Z. 1847.

ORTALIS VIBRANS, (B. D. ii. 197.) Scholz, S. E. Z. 1849. O. FULMINANS, Bou., E. Z. viii. 1847.

PLATYSTOMA (B. D. ii. 193.) *umbrarum*, Per., M. S. Liège. x. 1855

ULIDIA DEMANDATA, (B. D. ii. 193.) Bou., Ng.

SEPSIS CYNIPSEA (B. D. ii. 208.) Wwd., M. C. I. ii.

NEMOPODA CYLINDRICA, (B. D. ii. 211.) Bou. Ng.

THEMIRA LEACHII, (B. D. ii. 212.) Bou., Ng.

Fam. xxix. ŒSTRIDÆ. Larva metapneustic (?), acephalous, entozoic. Pupa obtected.

ŒSTRUS BOVIS, B. D. ii. 270. Joly, A. S. Lyon: ix. 1846. *O. lineatus*, Villars, (*elaphi* Schranck,) Kellner, E. Z. 1847.

CEPHALEMYIA OVIS, B. D. ii. 272. Joly, A. S. Lyon: ix. 1846. Hennig, D. N. H. Z. 1855. Newport, Cyclopædia of Anatomy. C. PICTA, B. D. ii. 272. Redi, Opera: i. Kellner, E. Z. 1847. Clark, Zoologist: v. 1847. Hennig, (*capreoli?*) D. N. H. Z. 1855.

CEPHENEMYIA TROMPE, Rzbg., F. I. iii. Kellner, E. Z. 1847.

GASTEROPHILUS EQUI, (B. D. ii. 274.) Joly, A. S. Lyon: ix. 1846. Hennig, D. N. H. Z. 1855.

See Schroder van der Kolk, Niewe Verhandelingen v. h. Koninkl. Nederlandsche Institut: xi. 1845. Schwab, Œstraciden; München, 1840, and the references collected by Wwd., M. C. I. ii. p. 575.

Fam. xxx. PHORIDÆ. Larva amphipneustic, acephalous, (entomobious?). Pupa obtected.

PHORA RUFIPES, (B. D. ii. 280.) Bou., Ng. Df., (*pallipes*,) A. S. N. xii. 1839. Rzbg., F. I. iii. Hg., Sb. W. A. x. 1853. Ztt., D. S. p. 2858. P. ATRA, (B. D. ii. 281.) etc. Bou., (*dauci*) Ng. P. ANNULATA, etc. Htg., F. J. B. ii. 1838. Gim., V. N. H. V. Riga: i. 1847. *P. caliginosa*, Br., Isis: 1846. For other species see Ct., B. E. 437. Df., M. S. Lille: 1840. Coquerel, A. S. E. F. vi. 1848. Scholz, S. E. Z. 1850.

Fam. xxxi. HIPPOBOSCIDÆ. Larva metapneustic, acephalous, development uterine. Pupa obtected. Df., A. S. N. iii. 1845. Blanchard, Institut: 1846. Leuckært, Bulletin de l'Academie R. des Sciences de Belgique: xxi. 1854.*

* There are considerable discrepancies among the authorities cited. The representation given by Leuckärt, which is the latest and seems the most probable, is that which I am disposed to follow.

Fam. xxxii. NYCTERIBIDÆ. Larva uterine. Pupa obtected.

Nycteribia Sykesii, Wwd., Transactions of the Zoological Society of London: i. 1835.

The abbreviations of the references in the foregoing list are the same, in general, as those employed in Walker's "Insecta Britannica, Diptera" (Lovell Reeve; London: 3 vols. 8vo., 1851–1856). For the sake of those who may not possess that work, and for the convenience of readers generally, a Table, in alphabetical order, is subjoined, of such abbreviations as there has been occasion to use here.

A. Holm. — Kongliga Swenska Vetenskaps Akademiens Handlingar.
A. J. A.—American Journal of Agriculture.
A. N. G.—Archiv für Naturgeschichte.
A. N. H.—Annals of Natural History.
A. N. V. Riga.—Archiv des Naturhistorischen Vereines zu Riga.
A. S. E. F.—Annales de la Société Entomologique de France.
A. S. N.—Annales des Sciences Naturelles.
B. D.—Insecta Britannica Diptera, by F. Walker, F. L. S.
Boh.—Bohemann.
Bou, (Ng.)—Bouché, Naturgeschichte der Insekten.
Br.—Bremi.
Ct.—Curtis, J.
D. N. H. Z.—Allgemeine Deutsche Naturhistorische Zeitung.
Desv., (Myod.)—Robineau-Desvoidy, Les Myodaires de France.
Dg., M.—Degeer, Memoires pour servir à l'histoire des Insectes.
E. M.—Encyclopédie Methodique.
E. Z.—Entomologische Zeitung, herausgegeben v. d. Entomologischen Vereine zu Stettin.
Ent. Mag. — Entomological Magazine, London: 1833–1838.
Fb., S. E.—Fabricius, J. C., Systema Entomologiæ.
Fln., D. S.—Fallen, Diptera Sueciæ.
G. Chr.—Gardiner's Chronicle, edited by Lindley.
Gim.—Gimmerthal.
Grm. M.—Germar, Magazin für Insektenkunde.
—— Z. E.—Zeitschrift für Entomologie.
Guer.—Guérin-Méneville.
Hal.—Haliday.
Hg.—Heeger.
Htg., (F. J. B.)—Hartig, Forstliches Jahresbericht.
Isis. — Isis von Oken, Encyclopædische Zeitschrift.
J. R. A. S.—Journal of the Royal Agricultural Society of England.
Klt.—Kaltenbach.
Kr., N. H. T.—Krœyer, Naturhistorisk Tidsskrift.
L.—Linnæus.
Linn. Ent.—Linnæa Entomologica, Zeitschrift herausg. v. d. Entomologischen Vereine zu Stettin.
Linn. S. Tr.—Transactions of the Linnean Society of London.
Lw., D. Btr.—Loew, H. Dipterologische Beitrage.
M. A. Lyon. — Memoires de la Société d'Agriculture, etc. de Lyon.
M. N. S. H. — Memoires de la Société Helvetique des Sciences Naturelles.
M. S. Liège.—Memoires de la Société des Sciences de Liège.
M. S. Lille.—Memoires de la Société des Sciences de Lille.
M. S. N. Mosq.—Memoires de la Société Imperiale des Naturalistes de Moscou.
M. S. R. A.—Memoires de la Société Royale d'Agriculture de France.
Mcq., D. N. F.—Macquart, Dipteres du Nord de France.
—— H. N. D.—Histoire Naturelle des Insectes Dipteres.
Mg., Zw. — Meigen, Systematische Beschreibung der bekannten Europäischen Zweyflügligen Insekten.
N. H. R.—Natural History Review (this Journal).
Ofw. Sw. A. — Ofversigt af Kongliga Swenska Vetenskaps Akademiens Forhandlingar.
O. P.—Oeuvres posthumes.
Per.—Perris, E.
R. M. Z.—Revue et Magazin de Zoologie, par Guérin-Méneville.
Rdn.—Rondani, C.

Rm., M. —Reaumur, Memoires pour servir à l' Histoire des Insectes.
Rsl., Ins. B.—Rœsel, Insekten Belustigungen.
Rzbg., (F.I.)—Ratzeburg, Forst-Insekten.
S. E. Z.—Zeitschrift für Entomologie, im Auftrage des Vereines für Schlesische Insektenkunde.
Sb. W. A.—Sitzungsberichte der K. K. Akademie der Wissenschaften zu Wien; Math. Nat. Hist. Klasse.
Schl. Btr.—Beitrage zur Entomologie, besonders im Bezug auf die Schlesische Fauna.
Schüm.—Schümmel.
Stg.—Stæger.
Swam., B. N.—Swammerdam, Biblia Naturæ.
Tr. E. S.—Transactions of the Entomological Society of London.
V. Schl. G.—Arbeiten und Veranderungen der Schlesiche Gesellschaft für vaterländische Kultur, u. s. w.
V. Z. B. V. W.—Verhandlungen des Zoologisch-botanischen Vereines zu Wien.
W. Zw.—Verzeichniss der Württembergischen Zweyflügligen Insekten, von C. L. F. v. Roser.
Wlbg.—Wahlberg.
Wwd., (M. C. I.)—Westwood, Introduction to the Modern Classification of Insects.
Wz.—Winnertz, J.
Zlr.—Zeller.
Ztt., D. S.—Zetterstedt, Diptera Scandinaviæ.

In conclusion, it appears from this list that while the history of many of the families is inferred only from the knowledge of that of a few genera in their earlier stages—sometimes from a single example,—and though the extent of that knowledge, in many cases, is very trifling, or little more than sufficient to guide us to further investigation, on the other hand there remain but *three* of the families in which we are absolutely without anything to be called information in regard to this part of their natural history; these are, ORPHNEPHILIDÆ (if, with Professor Rondani, we admit the family founded for the single genus Orphnephila), ACROCERIDÆ, and LONCHOPTERIDÆ. As no species of the second of these has been discovered in Ireland as yet, it would be hopeless to expect any elucidation regarding it from observations here. The case is different with respect to the other two, which are comparatively within our reach. The last-named family, in particular,—comprising the single genus Lonchoptera,—seems to present no particular difficulty in the way of the study of its history, as the individuals of various species of the genus are common enough, throughout almost the whole year, among moss, about roots of trees, &c., appearing even in the windows of houses in the town. With a view to excite some of our young and zealous students to observations which may dispel part of the obscurity yet resting upon these subjects, I have laid the preceding list before the Association, along with these cursory remarks.

ADDITIONAL NOTE ON THE METAMORPHOSIS OF SOME SPECIES OF DIPTERA, HITHERTO UNDESCRIBED, OR KNOWN BUT IMPERFECTLY. BY A. H. HALIDAY, A. M.

THE larvæ of the STRATIOMYDÆ may be considered as about the most perfectly organized among the Diptera. The well-characterized head, with distinct eyes, and the several parts of the mouth developed in pretty equal proportion, the configuration of the body, with its well-marked segments and firm and elegantly reticulated integument, and

the complexity of the respiratory apparatus, superadding the series of lateral spiracles to the curious fringed bell for air, which usually surrounds the posterior opening,—all concur to give them this rank. The larva of *Stratiomys*, both by its bulk and form, and the perfect development of that respiratory star, has attracted the attention of many observers; and has been repeatedly figured and described. Concerning the allied genus Oxycera, we had but some scanty indications, until lately that Heeger has figured and described in much detail the larvæ of two of the species, *O. meigenii* and *O. trilineata*. In a larva of the same genus, which I lately examined, I find several characters not noticed by him in either of those; and I am thence led to conclude that it may be progeny of a third species, O. morrisii, which I have repeatedly taken on the river-bank not far from the spot where the larva occurred among the Confervæ and Marchantia on the face of a dam serving for an outlet to the superfluous water of a mill-race, and continually moistened by a shallow but rapid fall of running water. This larva (Plate XI., Fig. 1) is four lines long, of a dingy yellow, with light brownish marblings above, especially a pair of jagged lines down the back, dividing it into three portions, the lateral portion of each segment chiefly occupied by a rounded yellowish patch truncated in front, and including an arched line of black dots; while the middle space of each segment presents a trapeziform pale patch, broadest behind, and including various markings: the third segment and the fifth have each a slender brown line bisecting them transversely, these two being connected in the middle by a similar longitudinal line; the posterior portion of the fifth contains two dark dots; the pale dorsal patch in the following segments is more or less clouded in the middle with brown, enclosing two pale dots, and before them two minute, defined black ones; the last segment has four longitudinal rows of black dots. The pale ciliated hairs which fringe the posterior opening are as long as the last segment. Besides the pale, curved, minutely pubescent bristles, placed chiefly in a whorl on each segment, there are above several clusters of shorter white cylindrical vesicles on each segment, except the first and last, which are probably modifications of hairs, but without any transition. The second segment has four dark dots in a square, and some more outside these; the dark internal termination of the spiracle appears as a blackish spot towards the angles of the segment. The parts of the mouth I have not examined, as Heeger has given figures of them in detail, which have a close analogy to the forms observed in the larva of *Nemotelus*. The general form of the larva agrees so well also with his figures that I have omitted many other details as unnecessary. The under side of the body is pale-yellow, and without markings, the whorl of curved, pointed bristles completed below, preceded by a line of shorter ones, seeming each to be enveloped in a membranous sheath. The penultimate segment is armed at the end with a pair of sharp, curved, spine-like horns: the last segment has a deep furrow down the middle, and one along each side. The head is darker-yellowish, with three deep-brown bands down the front, and some dark markings round the mouth; the eyes crystalline; the very minute antennæ dusky.

NEMOTELUS ULIGINOSUS.

This larva, about four lines long when full grown, is depressed and oblong, more equal in breadth than that of *Oxycera*, the sides more strongly lobed, the head narrower, the last segment cut into four marginal teeth, the respiratory cleft being not terminal, but placed above, in front of the two intermediate teeth; it is surrounded by a fringe of pale ciliated hairs, but these are not so conspicuous, being too short to pass beyond the margin of the segment, and closely incumbent on it; the four teeth are crowned with longer bristles than those on the rest of the body. The colour above is dingy yellowish-green, clouded with dark spots, a broader pale band down the middle, which includes two black dots in the anterior half of each segment from the fifth to the eleventh, and a brownish spot in the posterior, the segments being bisected transversely by an impressed line. Almost concealed in the incisures of the segments is a double transverse line of very minute black dots; some larger ones are placed in the lateral spaces, the largest of all being outermost, usually two others in a triangle with this, and some more in a waved line within these. The last segment has only five dots in a sinuous line at each side. The second segment shows the spiracles as oblique blackish spots, an appearance produced by the internal tapering process of the spiracles, which is entirely black, appearing through the skin. The pale, rather obtuse bristles of the body are arranged on the second segment, four in a whorl, in front of these six smaller ones, and one at each angle outside the spiracle; the other segments have mostly two whorls of eight in each above. The segments are generally a little dilated behind and rounded off, the lateral spiracles, which are placed far back, projecting in the hollow between the segments: there are a pair of such small spiracles in each segment from the third to the tenth, those of the third segment being the least. The underside of the body is paler, and nearly spotless, marked only with very minute black dots, disposed somewhat in the same manner as above; the bristles are placed more towards the side. The last segment beneath has a longitudinal furrow bounded by two ridges. The head is long and narrow, dark chestnut, smooth and shining; a ridge runs lengthwise to the insertion of each antenna, and between these a middle one continued to the mouth, where it divides into three branches, the lateral ones bounding the oral cavity, the middle one curving down into the spiny upper lip. The eyes are crystalline; the antennæ, seated in front of these and nearer to each other, are composed of a cylindric joint springing from an imbedded root, and crowned with a much more minute joint of like form, and beside it a longer bristle curved at the tip. The end of the ridged epistoma descends in a hook armed externally with several teeth crowned by spines, and a tuft of finer hairs incurved under its tip; the parts of the mouth are mostly dark-red; the labium strongly compressed, terminated by a broad, rounded, fan-like lobe, traversed by numerous radiating striæ (tracheæ), and thickly fringed below with soft hairs. The mandibles are oblong, the apex obliquely rounded off, and edged with a defined fringe of fine felted hairs. The

maxillæ are broad, composed of several pieces united, the internal lobe striated, and with a fringe of long hairs, the apex furnished with a jagged hairy process, probably representing a palpus. These maxillæ are frequently in lively, oscillating, parallel and alternate motion.

The pupa, much contracted in length, retains otherwise the general form of the larva.

The alimentary canal of the larva is more than three times the length of the body, and much convoluted; the ventricle, which occupies fully two-thirds of the whole, is attenuated at the points of flexure; anteriorly it expands into two pear-shaped chambers in contiguous succession, the first opening into the slender œsophagus. The four long and slender Malpighian vessels, with free ends, unite into a short but ample common duct before their insertion at the pylorus; the small intestine is slender, and only twice as long as that duct; the colon is abruptly enlarged into a pear-shaped muscular pouch, of a blackish colour, traversed lengthwise by pale fibres; the rectum, which returns on this at first in a contiguous curve, is not greatly shorter than the body, and expands behind into a pretty ample cloaca.

The coat of the larva, except the smooth head, is entirely and elegantly reticulated with cells nearly hexagonal, only a little transverse on the anterior segments; the black dots, which are regular in form and imbedded in the substance so as to appear on both sides alike, are in like manner surrounded with their own distinct annulus, and do not break the regularity of the reticulations, but these radiate from them as centres; so also the circular spaces formed by the origin of the bristles. On the other hand, the cloudy markings are equally indistinct on each side of the skin, and appear to be due to a pigment interposed between its layers.

This larva is common under dried-up Confervæ and other vegetable matter strewed on the ground, especially in marshy spots on the shore. Having placed some of them in a box with such food, and filled it up with flowers of Seapink as an elastic packing, I found several of the larvæ, soon after, feeding very busily, with their heads immersed in the flowers.

Alysia maritima (Ent. Mag., vol. v. p. 230) is a parasite of these larvæ.

Anthomyia riparia Fallen.

The fly, which will form the type of a genus allied to *Limnophora* and *Lispe*, abounds about the mill-dam where I found the larva of *Oxycera*. Mr. E. P. Wright, having observed a maggot common among the Confervæ on the face of the fall, suggested that it might be the progeny of this fly; which conjecture I have been enabled to verify by rearing it. The larva, which is exposed to a strong current in that situation, nestles deep among the vegetable matter, and is well armed for holding fast. At the end of May I could find very few of them, but the pupæ were abundant in the same situation.

The larva is about 4 lines long when extended, yellowish-white, tolerably transparent, tapering gently in front, obliquely truncated be-

hind, the projecting upper margin of the truncature ending in two short horns, curving out and backwards, and ending each in a simple spiracle of a black colour; the under side, more in advance, is furnished with two larger recurved horns, or false feet, beset, especially at the tip, with microscopic prickles. The base of the spiracular processes is also beset with smaller prickles inclining backwards. Immediately in front of the lower horns is a single prickly papilla in the middle line, and at each side of the preceding segments, about the incisures, there is a limited space furnished also with prickles. The first two (oral) segments are very small and retractile, blackish and transversely wrinkled; the mandibles blackish, linear, slightly curved; the fourth segment (prothorax) has a small spiracle at each side close to the anterior margin.

The pupa case, 3 lines long, and of a dark chestnut colour, is fusiform, the greatest breadth before the middle, the sides a little crenated, the surface entirely reticulated with concave dots, most regularly on the posterior segments; the two small anterior segments still marked with transverse wrinkles, the two pair of curved horns behind also remaining nearly as in the larva.

The flies that I reared came out in the middle of June, but the greatest number of the pupæ remained unchanged at that time.

Mr. Haliday read also, from Professor W. Smith, F.L.S., Corresponding Member—

MEMORANDA, CHIEFLY BOTANICAL, OF AN EXCURSION TO THE PYRENEES IN THE SUMMER OF 1856. PART III.

(*Concluded from* p. 50.)

The route from Cauteretz to St. Sauveur, which follows the Gave de Cauteretz in its descent to Pierrefitte, and the Gave de Baréges in ascending to Luz, presents a constant succession of fine mountain views. At Luz the gorge expands into a valley, and a bifurcation of the stream takes place, which, here separating, leads by its principal branch, under the name of the Gave de Gavarnie, to the romantic village of St. Sauveur, and the great "sight" of the Pyrenees—the Cirque of Gavarnie. We followed the stream to St. Sauveur, and found comfortable rooms in the Hôtel de France, commanding an excellent view of the Pic de Bergons, which rises to the height of 7080 feet. The view from the summit of this mountain is said to be one of the finest in the Pyrenees, and the ascent may be made on horseback; but unfortunately the weather during our stay was uncertain, and the sky obscured with clouds, so that the labour of ascending would have been thrown away as far as the view was concerned, and we were obliged to content ourselves with rambling in the gorge, on the edge of which the village is most picturesquely situated, raised about 150 feet above the torrent that roars below.

The season was getting too late for general Botany, and the neighbourhood of St. Sauveur did not supply me with many novelties. One species of fern, however, the *Asplenium fontanum*, grew in abundance

within a few hundred yards of the Hôtel; and the beauty and rarity of this elegant cryptogam would well repay the collector who visited St. Sauveur with no other object than to procure it from its native haunts. It is a doubtful native of Britain, and is omitted by Newman in his last edition of the British Ferns. Other authors have admitted it, but with hesitation, into the British Flora; and young specimens of several of our ordinary *Asplenieæ* bear so close a resemblance in general form to the present plant, which in its native state fruits in profusion, and has a very characteristic habit, that it is probable that the specimens said to be collected in a few English and Irish localities were only immature fronds of larger species. Specimens thus referred to, *A. fontanum*, have been collected in the immediate neighbourhood of Cork, but, not presenting any appearance of fructification their claim to be admitted under this species must, for the present, be rejected.

We availed ourselves of a fine morning, promising a favourable day, to accomplish a visit to Gavarnie. This excursion, "en rigeur," with all strangers is certainly the finest in the more accessible parts of the Pyrenean range, and should on no account be omitted by those who desire to obtain a correct idea of their peculiarities of scenery. Nothing can be finer of its kind than the entire route from St. Sauveur; and the sublime grandeur of the Cirque at its termination makes the traveller forget the toil of the ascent which he has been making for fifteen miles. The road is a narrow but well-kept pathway, practicable for horses to the very entrance of the Cirque, though in many parts cut out of the mountain sides, and rather trying to the nervous equestrian, who can look down from his horse into a precipitous defile whose depth is often concealed by overhanging brushwood, and can only be guessed at from the noise of the rushing torrent that reaches the ear in a faint murmur from below. At about eight miles from St. Sauveur we caught a momentary sight of the highest ridge of the mountains to the south, and remarked a curious gap at the summit of the crest, appearing like a gateway in the snowy line; this was the Brèche de Roland, which owes its existence, as the legend affirms, to the strength of arm and powerful sword of this redoubtable hero. Though an opening 300 feet high and 350 feet wide, it seemed at the distance at which we viewed it not larger than an ordinary doorway. The ascent to the Brèche is a most difficult and somewhat dangerous undertaking, and is only attempted by the more hardy and adventurous pedestrian, yet the gap is used by the peasantry as a pass into Spain, and often serves as a means of eluding pursuit to the athletic smuggler. Its absolute elevation is about 10,000 feet. The Brèche is lost sight of as the half-way village of Gèdre is approached, the intervening ridges shutting out the view of the higher mountains.

At this village I made the acquaintance of a native botanist, M. Bourdell; he is schoolmaster of the commune, and occupies his leisure in collecting and drying the plants of the surrounding mountains. I obtained from him, for the small sum of about twenty shillings, 250 carefully preserved and correctly named specimens; he seems well deserv-

ing of encouragement, and will, I hope, be visited by any naturalist who may pass his door.

Between Gèdre and Gavarnie the path is carried through a valley, which in one spot is thickly strewed with immense fragments of rock, fallen from the mountains above: the zig-zag windings of the route through this valley of debris is extremely curious; and the entire scene is of an aspect so singular and wild, that the place has rightly been named Chaos. Soon after escaping from the intricacies of this labyrinth, we reached the village of Gavarnie; and three miles further on arrived at the Cirque, where a rude cabin affords refreshment both for the traveller and his wearied steed.

Of the Cirque itself it is impossible to convey an accurate idea by mere description; indeed, it requires a considerable time before the spectator can realize its true character and extent, or fully appreciate its sublime proportions. It forms a perfect cul de sac, resembling a vast amphitheatre, cut out of the very bosom of the mountains, open to the north, by which access is gained to the interior, but closed in on every other side by a perfectly perpendicular wall of rock, from 1000 to 1500 feet in height. Overhanging the edge of this wall is suspended a line of snow, and down its sides pour numerous cascades: one, fed by the largest of the superincumbent glaciers, is of considerable volume, but the waters are so dissipated by the fall that they reach the floor of the Cirque in a cloud of foam, spanned by a glorious rainbow, in beautiful contrast to the dark rock and glistening snows of the background.

The width of the amphitheatre appears to be a few hundred feet,—it is really upwards of two miles,—and requires more than an hour to cross from the entrance to the foot of the grand Cascade.

Misled by appearances, we determined to scramble over the inequalities of the path; but, on approaching the cascade, found that the rush of wind produced by the fall of water, and the thick cloud of vapour that it spread to a considerable extent around, forbade all near access, except at the expense of a thorough wetting, and its probable result, a severe cold. The floor of the Cirque is occupied by the debris that has fallen from above, and by vast beds of snow that accumulate during the winter months, and rarely disappear until the very close of summer. Under these the streams from the cascades make their way, and the snow-beds have hence received the name of "Les Ponts de Neige." Over these we passed in perfect security, the heat of the sun having firmly consolidated the snow into a hard causeway.

We noticed that the cattle took advantage of these snow-beds to employ them as refrigerators, being stretched at full length upon their surface, the burning sun above and the icy ground below giving them a contrast of sensations which afforded them supreme enjoyment. We did not quite relish the same luxury, as the cold which penetrated our shoes was so intense as to be painful and distressing. The floor of the Cirque has an elevation above the sea of 6200 feet.

The botany of the Cirque and its neighbourhood appeared to be rich and varied. At the period of our visit many of the spring flowers were

over; but there still remained a few of great beauty and interest. The *Aconitum napellus*, of a deeper blue than the variety usually cultivated in our gardens, was everywhere abundant, and the *Iris zyphioides* coloured vast spaces with its large cerulean blossoms; the lovely *Gentiana verna* grew at the very edge of the glacier, and the curious *Soldanella Alpina*, not waiting for the melting of its winter covering, pushed its brilliant buds through the snowy ridges. The botanist wishing to see the Pyrénéan flowers in full variety and beauty should visit this locality in the beginning of July, and take up his quarters at Gèdre, or Gavarnie. At either village he will find accommodation of a homely but sufficient kind.

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A day's rest at St. Sauveur after the return from Gavarnie prepared us for the comparatively easy excursion to Barèges, which, however, we found more difficult than we had anticipated from the damage caused by the storm that had deluged the hills around. A vast avalanche of stones and soil had swept across the road from Luz to Barèges, and rendered the route impassable for carriages. So great was the force of the torrent that immense rocks were lodged in the middle of the highway, and workmen were engaged in blasting them with gunpowder to effect their removal. The waters had, however, partly subsided, and we effected our passage with the aid of guides, who led our ponies through the stream. These accidents are so frequent on this route that it sometimes happens that Barèges and its numerous visitors are reduced to considerable straits for fresh provisions by the interruption of all direct communication with the villages of the plain from which they derive supplies. Barèges itself is a mean street, principally of wooden houses, inhabited during the summer and autumn, and abandoned in the winter to the wolves and to a few peasants, who gather into the Bath-house, and find shelter and warmth in the vacant baths and saloons of the establishment.

Its situation is wild and desolate in the extreme, and nothing but the great efficacy of its mineral waters could induce its numerous visitors to tolerate its sombre and melancholy influence. Their sources, which, owing to the civility of the superintendent, I had an opportunity of minutely examining, abound in Barrègine, indicating the presence of sulphur and other ingredients which confer upon them their wonderful efficacy in cases of cutaneous and ulcerous affections. They are also most abundant, affording a stream sufficient to supply 500 baths; but the edge of the Gave, near which they originate, allows room only for a limited establishment and the necessary lodgings for patients, and every winter numerous houses are swept into the flood by the violent inundations to which the stream is subject.

The Government has an hospital here for soldiers suffering from indolent sores produced by gunshot wounds, and at the time of our visit this hospital was crowded with Crimean heroes, objects of great interest and attention to the other visitors.

August 4th. We left St. Sauveur for Bagnères-de-Bigorre, passing again by Pierrefitte through the valley of Argelez and the towns of Lourdes and Tarbes. The greater part of the route was flat and uninteresting, and the heat in the plain insufferable; but at Tarbes, where we again turned our faces towards the mountains, the views, though distant, were fine and varied.

At this time the corn harvest was over, and the peasantry were busy threshing out the grain on open floors in the streets of Lourdes and in the farm-yards of the country districts. The maize, however, was not yet ripe, and the rich green of its foliage and silken tassels of its flowers relieved the dry and barren aspect of the fields from which the corn crops had been removed.

As we again approached the mountains and the town of Bagnères another storm of wind and rain swept over the outlying hills. In this case we saw, but did not feel, its effects. The narrow and well-defined limits of the storm were marked with great precision, and we could distinctly trace the line of the wind and rain as they coursed along the base of the ridge before us. Indeed, as we continued to advance, we came upon the path of the storm, so accurately marked that we noticed one-half of the road in puddle and the other in dust. Numerous trees had been broken or prostrated in the immediate suburbs of the town, and yet at less than two miles distant we had a brilliant sun and perfect calm.

Bagnères de Bigorre is delightfully situated at the entrance of a valley leading into the mountains, but rather too distant for pedestrian excursions. The neighbourhood is well wooded, and the country walks numerous and shady. The town itself has a *rus-in-urbe* appearance, very different from most French cities, and contains several good hotels. The Hôtel de Paris, at which we took up our quarters, was by far the best we had met with in our present journey, and left nothing to desire on the score of civility, cleanliness, and comfort.

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The mineral springs at Bagnères are very numerous, but few of them of great strength: they are chiefly valuable as forming a good preparation for the more powerful sources of Cauteretz or Barèges. The Salut source, about a mile from the town, is the most frequented, and is pleasantly situated at the end of an umbrageous avenue, the early morning's walk to this source being probably the secret of much of its efficacy. It is saline to the taste, and far from unpleasant, having a brisk refreshing effect; but neither this nor any of the other springs appears to have much sulphur in its composition, if I may judge from the absence of Barrègine, which I could nowhere detect in the waters at Bagnères.

The Flora of the country around Bagnères is said to be rich in species, the Pic du Midi and Mont Hyeris being especially productive in rare and beautiful plants. The season was, however, too advanced for successful herborization, and I was forced to content myself with noting the few flowers in the hedgerows and banks around. *Saponaria officinalis* was conspicuous everywhere, and *Erica vagans* might be found in great abun-

dance on the slopes of Mount Olivet, that overhung the town. The path from the Salut through the woods, at the base of Mount Olivet, was lined with a profusion of *Wahlenbergia hederacea*, a delicate little campanula, not uncommon in our Irish bogs, but which here occurred on *dry* clayey banks.

The court-yard of the Thermal establishment supplied me with specimens of *Adiantum capillus-Veneris*, which I have noted as growing at Pierrefitte, more than twelve miles distant in a direct line.

M. Phillipe, the well-known and able botanist of Bagnères, informed me that he had in vain sought for this fern in the neighbourhood of Bagnères, and accounted for its presence in this singular locality from the warm and moist exhalations of the springs, supplying an atmosphere congenial to its growth, but of the manner in which the spores had been conveyed he could give no satisfactory explanation.

M. Phillipe is a zoologist and geologist as well as a botanist, and has good collections in each department, specimens from which he disposes of to naturalists at a very moderate price. I had from him excellent series of Pyrénéan mosses and lichens for our College Herbarium.

The uncertainty of the weather and lateness of season determined us to abandon our design of visiting Bagnères-de-Luchon and the eastern Pyrénées, and to reserve these for some future opportunity. We, therefore, left Bagnères-de-Bigorre on the 9th of August, and, proceeding by Pau and Dax, took the railway to Bourdeaux and Paris, visiting *en route* the fine old towns of Angoulême and Blois, reaching London on the 16th, and Cork on the 24th of August.

Dr. Harvey read the following—

SHORT DESCRIPTIONS OF SOME NEW BRITISH ALGÆ, WITH TWO PLATES. (TAB. XII. AND XIII.)

1. Leathesia *crispa*.—Frond subglobose or irregularly tubercular, small, olivaceous, firm, and solid; medullary threads very densely crowded, empty, dichotomous, with very long articulations; peripheric ramelli club-shaped, incurved or arcuated, submoniliform; the articulations about as long as broad, unequally constricted at the nodes; spores pyriform.—Tab. XII. A.

Growing on *Chondrus crispus* in the Clyde, at Cumbræ, April, May, and June, 1853. (Mr. Roger Hennedy.)

Fronds 1–4 lines in diameter, globose, at length irregularly shaped and confluent, of a very firm and dense substance, always perfectly solid. Mr. Hennedy, who watched the plant carefully for a period of three months from its first discovery, remarks that he can always distinguish it from the young of *L. tuberiformis* by its firm and solid character, by merely applying a finger and thumb to the little frond. Under the microscope it is readily known by its curled apical filaments, or peripheric ramelli, which are unequally constricted at the nodes, being crenate along the outer edge of the filament, and even along the inner;

but are not *regularly* moniliform as they are in *L. tuberiformis* and *L. umbellata*.

At first I was disposed to think this the same as *L. umbellata*, Ag., but on comparing them together under the microscope the difference in the peripheric ramelli, added to the different habitat, appears to forbid their being united. I have received *L. umbellata* from *Kützing*, *Zanardini*, and *Lenormand*, in all cases growing on the receptacles of *Cystoseira granulata*.

Plate XII. A, Fig. 1, *Leathesia crispa* growing on *Chondrus crispus*, the natural size. Fig. 2, part of a filament, with its curled apical ramelli, magnified. Fig. 3, ramellus and spore, more highly magnified.

2. Elachista *Grevillii* (*Arn.*)—Tufts pencilled; filaments somewhat rigid, elongate, slender, cylindrical, slightly narrowed at the base, and scarcely attenuate at the apex; lower articulations shorter than their diameter, upper as long as broad; tubercle minute.—Tab. XII. B.

On *Cladophora rupestris*, at Largs (Dr. Greville), July, 1852; and at Corrighills, Arran (Professor Walker Arnott), the same year.

Similar in many respects to *E. fucicola*, but smaller, with shorter joints, and arising from a much smaller tubercle. It is remarkable, too, for its habitat, growing on one of the Chlorospermatous Algæ, whose fronds it infests often as densely as *C. fucicola* does those of the Fuci. The habitat of this species seems sufficiently to refute an opinion which has sometimes been maintained, that the Elachistæ are merely abnormal cellular growths of the plants on which they are found. Such an inference might appear plausible in the case of species growing on the *Fuci* or the *Dictyoteæ*, whose cells are of a similar character; but the differences between the cells of *Cladophora rupestris* and those of the parasite are too great to allow of their being confounded. Other characters apart, then, the *habitat* of the present little Alga induces me to give it a local habitation and a name.

Plate XII. B, Fig. 1, *Elachista Grevillii* growing on *Clad. rupestris*, the natural size. Fig. 2, portion of the tuft magnified. Fig. 3, apex and base of a filament more highly magnified.

3. Actinococcus *Hennedyi*.—Frond effused, indefinite in outline; filaments simple, or slightly branched, attenuated upwards; articulations once and a half as long as broad; tetraspores large, cruciate, quadrate.—Pl. XIII. A.

On an old root of *Laminaria digitata*, at Cumbræ (Mr. Roger Hennedy), 1852.

I should have supposed this to be *A. simplicifilum* (*J. Ag.*), but that the frond or crust is indefinitely extended, and the filaments are frequently once or twice branched; the articulations are nearly similar. The *tetraspores* in our plant are very large, forming beautiful necklace-like strings of deep-red beads.

The specific name is given in honour of its discoverer, Mr. Roger Hennedy of Glasgow, a most acute and successful explorer of the minute Algæ.

Plate XIII. A, Fig. 1, magnified view of a portion of the crust of *Acti-*

nococcus Hennedyi. Fig. 2, fertile and barren filaments separated. Fig. 3, a tetraspore.

4. Cruoria *pellita* (Fries.).—Crust of indefinite extent, dark-red brown; filaments much branched below, dichotomous, and somewhat corymbose above, attenuated upwards; tetraspores lateral, zonate, fusiform, J. Ag., Sp. Alg., vol. ii. p. 491; Aresch. in Linnæa, xvii. p. 267, Tab. 9, Figs. 7, 8; *Chætoderma pellitum*, Kütz., Phyc. Gen., p. 326; not *C. pellita* of Harv., Phyc., t. 117.—Tab. XIII. B.

On rocks, &c., between tide-marks, on several parts of the coast; Miltown Malbay, 1831 (W. H. H.); Sound of Jura (Professor Walker Arnott); Cumbræ (Mr. Roger Hennedy).

This forms a scab-like, tough, dark-brown, or reddish crust, on the surface of rocks, to which it adheres very closely. The crust is wholly composed of vertical filaments, which are much branched, and robust at the base, and gradually taper upwards, becoming less frequently divided, and more regularly dichotomous. Large zonate spores of dark-red colour, ellipsoid or fusiform, often much pointed, are found hidden among the filaments, and are formed by the transformation of one of the branches. I am indebted to Professor Walker Arnott and Mr. Hennedy for specimens in fruit.

In the "Phycologia Britannica" I have figured a very different plant, namely, *Petrocelis cruenta* (*J. Ag.*), under the name *Cruoria pellita;* a mistake into which I ought not to have fallen, as I appear to have had both plants for many years in the Herbarium. Both form crusts on rocks, and to the naked eye are undistinguishable. Under the microscope, however, the *Petrocelis* is seen to be formed of simple filaments, having when in fruit a single *cruciate* tetraspore formed in the middle of each filament; while the Cruoria, now described, consists of much branched filaments, bearing *zonate* tetraspores. The figure given in Phyc. Brit., t. 117, represents the half-ripe state of the Petrocelis; in ripe specimens the large central cell becomes a tetraspore.

Plate XIII. B, Fig. 1, part of the crust of *Cruoria pellita*, magnified. Fig. 2, portion of a filament. Fig. 3, a tetraspore.

5. Cruoria *adhærens* (J. Ag.).—Crust of indefinite extent, brown-red or olivaceous; filaments parallel, sparingly dichotomous, attenuated upwards; tetraspores lateral, zonate (J. Ag., Sp. Alg., vol. ii. p. 491).

On rocks between tide-marks, in various places: Kilruggan, opposite Gouroch (Professor Walker Arnott); Aberdeen (Dr. Drickie); Penzance (Mr. Ralfs); Kilkee, 1844; Cushendall, Co. Antrim, 1850 (W. H. H.).

Very similar to the preceding, but with less branched threads. Professor Arnott communicates specimens with tetraspores. I have also received from the same liberal correspondent mounted specimens of a Cruoria (?) which is figured in our Plate XIII. C, but which I am uncertain whether to describe as a new species, or, perhaps, the type of a separate genus, under the name *C. Arnottii*, or to regard as the cystocarpal state of *C. adhærens*. The filaments are subsimple, or sparingly dichotomous, as in *C. adhærens*, but are of a smaller diameter, with shorter articula-

tions. But the remarkable character consists in the fructification, which is a large, terminal, pyriform, *green* (!) spore, surrounded by a wide gelatinous limbus. In Plate XIII. C, Fig. 1, are represented some of the threads as they lie in the stratum, and Fig. 2, some separated, with a spore more highly magnified.

It is hoped that this short notice may direct the attention of observers to these curious littoral Algæ, one or other of which, and, perhaps, some new species not yet noticed, may be found on most of our rocky shores. The cystocarpic fruit of all the genera of the group, namely, Actinococcus, Petrocelis, Cruoria, and Contarinia, which differ from each other in the evolution of their tetraspores, remains to be discovered. I collected a species in Australia, which I have called *Cruoria* (*?*) *australis*, and which has cystocarps; but until the cystocarps be found in the originally described Cruoriæ, as well as in the allied genera, it would be premature to say whether the Australian species be a congener or not, as unfortunately its tetraspores are desiderata.

FRIDAY EVENING, JUNE 19, 1857.

W. H. Harvey, M. D., V. P., in the Chair.

The Minutes of the previous Meeting having been read, were approved of, and signed by the Chairman.

The following Donations were acknowledged, and the best thanks of the Association ordered to be given to the donors:—

"Dipterologiæ Italicæ Prodromus." Vol. I. By C. Rondani.

Other Essays on Dipterous and other Insects. By the same.

"Flora dei Foraggi Spontanei e Coltivati, dei Stati Parmensi." Fascicoli 1° e 2°. By Dr. G. Cocconi.

"Delectus seminium in Horto Botanico R. Univ. Parmensis," A. D. 1856.

"Cenni sul Muses Civico de Milano, ed Indice sistematico dei Rettili ed Amfibi esposti nel Medesimo." By Prof. G. Jan.

"Pallavicinia, Nuovo Genere di Piante Crocifere." By Dr. G. Cocconi.

"La Saggnia da Zucchero." By Prof. G. Passerine.

The above presented by Dr. Camillo Rondani, Professor in the Royal Athenæum, Parma.

"Linnæi Systema Naturæ." Editio 10ma. From A. H. Haliday, V.P.

"The Natural History Review" for January and April, 1857. From the Editors.

"A Catalogue of the Zoophytes of Northumberland and Durham." By Joshua Alder, Corresponding Member.

"Proceedings of the Dublin Geological Society." A complete set of the seven volumes. From the Council of the Society.

This being the last meeting for the Session 1856–57—

The Chairman, W. H. Harvey, M.D., F.L.S., Vice-President, read the following

ADDRESS.

With this evening's meeting the present Session terminates. We separate, each to his home, to occupy ourselves in various ways until October shall bring us once more within these walls to resume our winter studies. In dismissing you now, I wish to make a few observations connected with our future progress; and here I would first observe that the advancement of this Association mainly depends on the way in which its members employ their vacations. It is at this season of the year that Nature presents us with the greatest number of objects, whether in the animal or vegetable kingdom, in their greatest state of activity, and most accessible for examination. At this season, also, you have much more leisure for pursuits of this kind,—longer days and finer weather,—uninterrupted by the College studies which occupy so much of your time in the short days and long nights of winter. This, then, is the proper season for making observations in the field, which shall furnish us with subjects for interesting discussion when we next meet; or for those discoveries which shall advance our knowledge of the natural productions of Ireland.

When this Association was first established, it was proposed that it should consist of thirty-two members, one for each of the Irish counties, and each to be considered as the representative of some particular county, to the exploration of which he should particularly direct his attention. Could this plan have been carried out as far as its originators designed, and had our representative naturalists been duly attentive to their duties, we should have rapidly got together material on which to base a Natural History of the whole island. The plan was excellent on paper, but has not been found as yet very applicable in practice. Many of the counties continue unrepresented, and information from others comes in slowly and in a very desultory manner.

How can this be remedied? How can we best carry out the objects for which we enjoy possession of this room, and the other privileges allowed us by the University? It is vain to prescribe exact districts to the members; and we must only hope that chance or inclination will disperse them, and that, when so scattered over the country, they will not neglect the opportunities at their command. There is much still to be done in every department of Natural History in Ireland; many of our most interesting districts have only been partially explored by the botanist. In the West and South I have no doubt that new plants will yet reward a careful research; while several midland districts, and some of the northern, particularly the county of Donegal, remain almost unnoticed. I speak chiefly now of phænogamous botany; if we turn to the Cryptogamia, every district will supply abundant work to the student, and particularly among the Fungi, a vast class that has scarcely yet begun to be studied in Ireland.

But it is in Zoology that we particularly require new labourers in a prolific field which has as yet lain almost uncultivated, notwithstanding the labours of the distinguished men who have passed away from us, and those who yet remain zealously working here and there in their own localities. Our coasts have been very partially examined, except in the most cursory manner. The neighbourhoods of Dublin, of Belfast, of Youghal, of Cork, of Galway and Roundstone, and of parts of the coast of Clare, have yielded the great proportion of the observations yet made in marine zoology: because each of these has had its representative naturalist or naturalists who have patiently, from year to year, worked out its Fauna. Cursory visits to other parts of the coast have shown that excellent localities remain almost unnoticed, and particularly along the western shores. It is very desirable that the exact ranges of all the species found in the west, which are regarded as southern types, should be ascertained. Many of these are known to go as far north as Galway and Mayo; but it is uncertain at what point of the coast they cease in a northern direction. Even among the commoner of these Asturian types, such as *Echinus lividus*, exact geographical information is still required: as, where is this species (or such other) most abundant?—and how far does it extend, with what varying abundance, either to the north or south of its supposed centre? The tidal limits inhabited by each species should also be carefully noted, as was first systematically done by Professor Edward Forbes, when he divided the coast-line into zones of depth, each characterized by peculiar zoological or botanical features. Some species, it is true, inhabit more than one of his zones, but many, perhaps most, are strictly limited to particular depths of water; never straying much beyond a well-marked region. The relation between the nature of the locality—as respects soil and exposure, and that of the animals that inhabit it—often yields curious as well as important matter for observation. It is well known, for instance, that particular species of fish are of finer flavour and of larger size in one place than another; probably from differences in the nature of their feeding-ground. The same is true of the Mollusca: oysters from different localities vary enormously in size; and I suppose an epicure would distinguish by its flavour only, and with his eyes shut, a Carlingford from a Cork Harbour or a Burren oyster. So, also, there has recently been a discussion on *Akera bullata:* whether the specimens brought by Dr. Farran from Birterbui Bay be identical with those found in Dublin Bay, and which are of so much inferior size and fatness. I am not at all disposed to regard *mere size*, in such a case, as an evidence of difference of species; and I hope that some more exact characters may be ascertained, on re-inspection of the animal in its living state, than have yet been made out from the preserved specimens. As to *size*, the *locality* may very much effect it in *Akera bullata*, as well as in the common oyster. Birterbui Bay is peculiarly fitted to foster animal and vegetable life in luxuriance; and I can bear witness to the large size which many of the Algæ attain to in it, owing, as I believe, partly to its situation, for it forms a quiet reservoir of uniform depth, land-locked, and running a considerable way in-

land; and partly to the nature of the bottom, which in many places is muddy, the soil being very deep, and filled with much animal and vegetable matter. I believe the Akeræ in question were obtained on this rich feeding-ground, where they had opportunities of leading an indolent life in the midst of plenty. Hence, possibly, their peculiar character. But on this question it is premature to decide without more information than we possess at present; and I wish some of our members who have leisure, in the coming season, may visit Birterbui and Roundstone Bays, which were once so well known to us by the labours of the late Mr. M'Calla; and which, no doubt, will yet yield much more to the naturalist than has yet been got from them. I never remember to have visited any locality, in this or any other country, where dredging could be so profitably, so easily, and so pleasantly pursued. The bays are so much sheltered that boating in one or other may almost always be enjoyed; and there is much variety in the nature of the bottom. The water is as clear as crystal in Roundstone Bay, and objects at the bottom may be seen, in calm weather, at a great depth; so that the naturalist may often judge, by personal inspection, where to drop his dredge with the certainty of bringing up the objects he is looking for.

Speaking of clear water and quiet bays reminds me that I ought more particularly to direct the attention of our marine zoologists to the exquisitely beautiful and curious, but evanescent creatures, which have furnished us with this evening's paper. Mr. Greene has shown us, by the living specimens on the table, and by those which he has described in his essay, what a single hour's work in Kingstown Harbour on a calm summer's morning may furnish. The naked-eyed Medusæ lead a most luxurious life, basking in the upper strata of sunny waters, or quietly swimming near the surface, to which they rise chiefly when all is calm and pleasant; retiring to greater depths in rough weather. They are so much the colour of the water that they can scarcely be detected, save by their movements, or by the rainbow tints reflected from their crystalline bodies as they catch a ray of light in varying positions. Their forms are endlessly varied, yet within definite limits; and Professor Forbes, in his admirable memoir on the subject, has shown us how they may be scientifically studied, and also what kinds the British naturalist may encounter in his researches. But Forbes's memoir must be taken merely as a commencement from which researches are to proceed. The species described in it were chiefly procured in summer yachting excursions to the Orkney and Shetland Islands. Very many favourable localities are either nearly or altogether unsearched, and Dublin Bay is probably one of these. But Roundstone Bay, of which I have already spoken, Cork Harbour, and Bantry Bay, would probably still more richly repay an exploration. The only hindrance to the study of these creatures is their perishable nature. It is difficult to preserve them for the museum; they must be studied on the spot where they are collected, and within a few hours after capture, for they soon melt away into colourless jelly. But, to a naturalist who has leisure to devote a few

summer holidays to marine excursions, they offer one of the most attractive objects of study—if beauty of form, delicacy of structure, and singular transmutations can arrest his notice. If they be naked and naked-eyed, there is nothing repulsive in their nakedness. It is "nature's dress," which (as the poet tells us) is "loveliness." Their movements, too, whether they proceed by muscular contractions and expansions of the disc, or by the aid of minute paddles, are singularly graceful. It is a pleasure peculiarly adapted for a sultry day's enjoyment merely to sit and watch them pulsating through the water. Nor is the interest confined to daylight, for many are highly luminous, and much of the luminosity of the sea is caused by creatures of this kind; so that, though among the least complex and humblest of nature's productions, they still have a history which is worth knowing.

But what is there of nature's wôrkmanship that is not worth knowing? We may begin with Diatoms and Desmids, intending to proceed further when we have mastered these. But, if we once get into that subject thoroughly, even this small branch of natural history will afford pleasant occupation for years, or for a lifetime, as the case may be. I do not wish to advocate such exclusive studies. It is much more profitable to mind and body to affect variety in Natural History pursuits, so as to have an equal acquaintance with as many groups as possible. Too much devotion to any one class of objects, to the exclusion of others, is to be discouraged, especially in a young naturalist. Yet it is also well to have a *definite* object for study, one which may be taken up from time to time, and be kept constantly before the mind, but not allowed to absorb more than a due proportion of time and attention. It is very difficult, however, to preserve a happy mean in such cases. Thus we have botanists divided into phænogamists and cryptogamists; and the latter subdivided into filicologists, muscologists, fungists, lichenologists, algologists, and we may add desmidiologists and diatomists. Zoology is equally split up into minor sects, each assuming more or less the characters of a distinct science, and with a distinct nomenclature. So that it is rare, in modern times, to find a general naturalist whose studies comprehend those of all his fellow-students, and who can turn with equal zest from a Desmid and Diatom to an eagle or an elephant; and be prepared to answer a question addressed to him by a student in any department of Natural History. Such a naturalist was Edward Forbes,—and such, to a great extent, was the late President of this Association, whose loss is still fresh in all our minds. If there were branches of Natural History which he had not himself studied, he yet knew *who* had studied them, and where the best information was to be obtained respecting them. And in this way he often assisted the researches of men working at a particular group, and who were not as familiar as he was with the literature of their subjects. Few men were better qualified than Dr. Ball to have the direction of the studies of others, and it is a thousand pities that his talents were, in this respect, so little employed. For, though his influence in furthering Natural History studies in Ireland was great, and the work which he thus effected,

such as few others have done so extensively, yet those who knew him best were conscious that he scarcely accomplished a tithe of what he was capable of doing, and what he had designed to do. His conceptions of most subjects were full and just, and, if wrought out at the time, his objects were generally effected; but interruptions too frequently disturbed him—procrastination followed—and thus, from one cause or another, much for which he had made large preparation, was left undone. And thus his memory may suffer with the world, which judges men frequently not by what they really were, but by what accidental circumstances have made them.

We, who knew Dr. Ball intimately, will judge him differently, and must continue to cherish his memory with warmer feelings. He was the founder and first President of this Association. To him it owes the position it holds in College, and to his influence with the Board are we indebted for most of the privileges we enjoy. His attendance at our meetings was constant; and he was ever most anxious to extend our studies, and make them useful to ourselves as students, and to science in general. We shall, therefore, best fulfil our duty to his memory, if, as members of an Association for the promotion of Natural History, we endeavour, each in his several department, to keep up the spirit of our meetings by bringing forward records of observations and discoveries, and making our proceedings, annually printed, the receptacle of new and useful information.

To such of our Members who have quitted our College walls, and flown to distant regions of this world, a wide field is open. Let them but spend a few minutes of their leisure in following up the pursuits that they loved here; let them send home specimens to fill up the many blanks in our University collection, and notes on these specimens to interest and instruct us at our Evening Meetings; and they will add their knowledge, like gentle tributaries, to swell the rapidly increasing river of Natural Science. Canada and Ceylon, St. Helena, and many other places, number among their inhabitants members of our Alma Mater, who might do great things for us.

I would for one moment revert to a new feature in our proceedings for this year. I allude to our open-air meetings. The first of these consisted of a visit to Powerscourt Demesne, which was liberally thrown open to us by the courtesy of Lord Roden. Not a cloud came to cast a shadow over our sky, and we spent the day right pleasantly.*

The next excursion was to Howth, and, although the day was not as fine as on the previous excursion, yet it passed off most agreeably too.

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* We would except the ignorant and stupid conduct of Thomas, the gate-keeper of the entrance to the Waterfall, who insisted that his Lordship's order to admit the Members of the Association to the *whole of the demesne* did not allow us the privilege of entering the Deer Park, and obstinately refused to listen to any reason; nor would he admit us until, after the lapse of some hours, an order happily obtained from a head official proved more potent than the one we possessed from the noble Lord.—Hon. Secs., D.U.Z. & B.A.

The number who attended the first excursion was twenty-four, and the second, fourteen.

And now, gentlemen, trusting that the vacation will not be spent by any of us in idleness, but in field or open-air studies, let us adjourn until October next.

A. H. Haliday, A.M., communicated a note supplementary to the list of the genera Diptera the earlier stages of which are known (see "Proceedings," p. 180 of this volume).

At the time this list was drawn up I had not seen a paper by Professor Rondani ("Osservazioni sopra parecchie specie di esapode afidicidi etc." nei Nuovi Anali delle Scienze Naturali de Bologna, A. D. 1847), in which two more genera of the Syrphidæ are illustrated by the following examples:—

Pipiza varians Rdn.

Paragus bicolor Ltr. P. quadrifasciatus Mg. P. coadunatus Rdn.

In the same paper Rondani has given the history also of another Cecidomyia, the larva of which feeds on Aphides, and of Leucopis lusoria, and of four other (new) species of that genus.

In the "Transactions of the Zoological and Botanical Association of Vienna," vol. v., A.D. 1855, Frauenfeld has traced the history of some species of Diptera, here enumerated according to the determination by Schiner in the sixth volume of the same "Transactions," A.D. 1856:—

Cecidomyia (Asphondyla) scrophulariæ Sch. Asph. sarothamni Lw.

Tephritis mamulæ Fr. (T. terminata Mg. not Fln.) T. femoralis Desv. (*Aciura*). T. longirostris Lw.

Agromyza maura Mg.

GEOLOGICAL SOCIETY OF DUBLIN.

WEDNESDAY EVENING, MAY 13, 1857.

Professor Apjohn, M.D., F.R.S., M.R.I.A., in the Chair.

Rev. Professor Haughton read the following paper—

ON THE SILICEO-FELSPATHIC ROCKS OF THE SOUTH OF IRELAND.

It is well known that siliceo-felspathic trap rocks of a peculiar kind are found in the mining district of the Ovoca, county of Wicklow, and in the mining district of Bonmahon, in the south of the county of Waterford; and the recent investigations of the Geological Survey in the west of Kerry and Cork have brought to light the existence of great quantities of similar rocks in the neighbourhood of Killarney, and in the moun-

tains to the westward stretching to the south of Kenmare Bay; and it is not at all improbable but that these remarkable felspathic rocks may in this district be associated with the copper lodes, which have proved so productive in the Berehaven or Allihies Mine. These rocks have a general resemblance to each other in all these districts, and when once seen and recognised, cannot be easily mistaken for any other description of rock; they are of a pale-bluish or greenish-gray colour, weathering white to the depth of several inches, slightly translucent on the edges, of conchoidal fracture, and sharp metallic ring under the hammer.

The Cornish miners who are acquainted with the mining districts of Wicklow and Waterford consider these rocks as the equivalents of their own Elvans, to which they bear no external resemblance, though it cannot be denied that they appear to exert an equally favourable influence on the productiveness of the metallic lodes with which they are associated; and the results of my analyses prove that they have an intimate relation to the granitic rocks in their chemical and mineralogical composition. The resemblance in composition to some varieties of granite is, indeed, so striking, that it requires but a slight effort of the imagination to conceive them as granites cooled under peculiar circumstances, which prevented the development of the usual crystalline structure.

In some cases, however, these siliceo-felspathic rocks appear to be deposited in stratified beds, conformable to the slates and felspathic ash-beds with which they are found associated. This is particularly the case in the Ovoca district, where the mass of felspathic rock is found to lie between dark soft slates of the Silurian age, and has never been observed to penetrate these slates in dykes.

I shall now proceed to the discussion of the analyses of these rocks from the Wicklow, Waterford, and Killarney districts respectively:—

1. *Siliceo-felspathic Rocks of the Vale of Ovoca, county of Wicklow.*

The cupriferous and pyritous lodes of this district have a N.E. and S.W. bearing, and an underlay to the S.E. They appear to be nearly conformable to the planes of bedding of the slate in which they occur; and they are overlaid to the S.E. by a thick mass of siliceo-felspathic rock, which rises into the remarkable hill called the Bell Rock, on the west side of the Ovoca. The lodes are all dislocated by a left-handed heave, coinciding apparently with the direction of the Ovoca Valley, and the felspathic rock partakes of this movement of the lodes. It has a stratified character throughout, and in places, as near the Tigroney Mine, it assumes completely the character of an ashy-slate, weathering perfectly white.

I obtained specimens of the Bell Rock from Mr. Edward Barnes, Resident Director of the Wicklow Copper-Mine Company, which were procured by blasting two or three feet into the rock, so as to obtain a portion quite free from the action of the weather. The specimens are

of a pale-greenish colour, exceedingly hard, striking fire freely under the hammer; but, when subjected to long-continued action of the reducing flame of the blow-pipe, melting slightly on the edges, particularly in the neighbourhood of the minute specks of silicate of iron which appear here and there through the body of the rock.

The following analysis will serve to give an exact idea of the composition of this rock, which is more siliceous than the felstones of Waterford and Killarney:—

	Per cent.		Atoms.
Silica,	81·36		1·808
Alumina,	7·86	0·151	0·192
Peroxide of iron,	3·32	0·041	
Lime,	0·99	0·035	0·206
Magnesia,	0·45	0·022	
Potash,	3·09	0·065	
Soda,	2·63	0·084	
	99·70		

It is evident, from this analysis, that the atoms of protoxides and peroxides are about equal in quantity, and that the rock may be represented by a mixture of felspar and quartz:—

$$Q + F = 1{\cdot}808,$$
$$F = 0{\cdot}199.$$

From these equations we find that its mineralogical composition is as follows:—

	Per cent.
Quartz,	45·54
Orthoclase felspar,	54·16
	99·70

2. *Siliceo-felspathic Rocks of Knockmahon, county of Waterford.*

The felspathic rocks of Knockmahon are intimately associated with the copper lodes which have rendered that locality famous, and occur abundantly on the shore below the village of Bonmahon, in prismatic masses of a columnar structure, which have received the name of the Bishop's Library. These rocks occur also, and are well shown, in a cutting for a tram-road connecting Tankardstown with Knockmahon Mine. In this latter locality they occur stratified conformably with the brown fossiliferous Silurian slates which are found at the Tankardstown Mine. The following analysis is of a specimen taken from the stratified siliceo-felspathic rocks of the cutting of the tram-road:—

	Per cent.	Atoms.	
Silica,	77·20	1·715	
Alumina,	6·54	0·126	0·199
Peroxide of iron,	5·82	0·073	
Lime (carbonate),	1·81		
Magnesia,	0·60	0·030	0·206
Potash,	3·69	0·078	
Soda,	3·03	0·098	
Water,	1·12		
	99·81		

This rock, like that at Ballymurtagh, county of Wicklow, is a compound of quartz and felspar. If it be regarded as a sedimentary rock, it must be considered as a trappean ash, composed of felspar and fine quartzose mud, with a slight admixture of carbonate of lime. Its mineralogical composition is as follows :—

	Per cent.
Quartz,	40·81
Orthoclase felspar,	57·19
Carbonate of lime,	1·81
	99·81

3. *Siliceo-felspathic Traps of Benaunmore, county of Kerry.*

The hornstones, or siliceo-felspathic rocks of Benaunmore, occur in splendid columns, many of which, as described by Mr. Foot, of the Geological survey, are 200 feet in length. The rock is more translucent than the felspathic traps of Wicklow or Waterford already described, and presents more of the character of a truly igneous product. Its analysis gave the following results :—

	Per cent.	Atoms.	
Silica,	71·52	1·554	
Alumina,	12·24	0·238	0·277
Peroxide of iron,	3·16	0·039	
Lime,	0·84	0·030	0·278
Magnesia,	0·39	0·019	
Potash,	5·65	0·120	
Soda,	3·36	0·109	
Loss by ignition,	1·20		
	98·36		

This rock, like the others already discussed, is a compound of quartz and felspar; and it is easy to calculate the proportions of the two minerals as follows :—

	Per cent.
Quartz, ...	20·51
Orthoclase felspar, ...	77·85
	98·36

From the fact, that the felspathic trap of Benaunmore occurs in columnar masses, it may be inferred to be probably of igneous origin: it is massive, fine-grained, with rounded specks of quartz (globuliferous), and small occasional facets of felspar; brittle, of conchoidal fracture, somewhat lamellar, and translucent on the edges, with a ringing clink, and striking fire freely when struck with the hammer.

I have lately had an opportunity, in conjunction with Dr. Wilde of Dublin, of examining a very large number of stone implements found in various parts of Ireland, and I find that the different varieties of siliceo-felspathic rocks were carefully sought out by the makers of these implements. Among the most common varieties so used are the pure pale-green felstone, and a mottled porphyritic variety of the same kind of rock, streaked with pink felspar and dark-coloured metallic hornblende.

In the collection of stone implements preserved in the Museum of the Royal Irish Academy, there are also a number of stone implements from Jamaica, formed of the same kind of felstone, which would appear to have been particularly well suited to the purposes to which such implements are supposed to have been applied.

The felstones and siliceo-felspathic rocks of Ireland are only locally abundant, and as the weapons made from this kind of rock are found in all parts of Ireland, it is conjectured by antiquarians that an extensive trade in, and manufacture of, these felstone celts and weapons must have existed in former times in Ireland. This trade, if such existed, must have been confined to Ireland itself, as there is scarcely a single stone implement in the collection of the Irish Academy which cannot be readily identified as made of an Irish rock; and in many instances the locality from which it was obtained can be assigned with tolerable accuracy.

WEDNESDAY, JUNE 10, 1857.

EDWARD WRIGHT, LL.D., M.R.I.A., in the Chair.

DR. GRIFFITH read the following—

LETTER FROM M. ADOLPHE BRONGNIART TO MR. GRIFFITH, ON THE FOSSIL PLANTS WHICH HAVE BEEN DISCOVERED IN THE ROCKS AT THE BASE OF THE CARBONIFEROUS SYSTEM IN IRELAND: COMMUNICATED TO THE SOCIETY BY THE LATTER.

Paris, 5 Février, 1857.

MONSIEUR,—J'ai reçu dans le courant du mois de Decembre les échantillons de plantes fossiles que vous avez bien voulu m'addresser,

ainsi que les lettres et les dessins qui les accompagnaient. Je les ai immédiatement examinés avec beaucoup d'attention, et je vous prie d'agréer tous mes remerciments pour cet envoi et ces renseignements pleins d'intérêt pour moi.

Je vais vous communiquer le résultat de cet examen, en regrettant qu'il ne me conduise pas à des conclusions positives relativement à la position géologique du terrain, qui renferme ces échantillons.

1°. *Echantillons de Kiltorcan.*

No. 11, 12, 6, 9, 2. Sont tous des échantillons bien mieux conservés et plus complets que ceux que j'avais vus précédemment de la fougère nommée *Cyclopteris* Hibernica*, et que j'avais cru d'apres les premiers échantillons appartenir au genre *Odontopteris*—ceux ci me font bien mieux concevoir qu'ils eussent été classés parmi les *Cyclopteris*, cependant ce n'est nullement le genre naturel qui a reçu ce nom, il n' y'a qu' une analogie dans la nervation—la forme des folioles et leur disposition est bien plutôt celle des *Sphenopteris*, les nervures flabelliformes rapportent cette fougère à ce genre et surtout à la section ou genre nommé *Adiantites* qui a des pinnules entieres, non lobées, ou à peine lobées.

Mais je ne connais aucune espèce réellement voisine de celle ci, et peut-etre devra-t-elle former un genre particulier.

Par son port elle se rapproche du *Sphenopteris lobata* du terrain Permien, mais celle ci a les pinnules profondement divisées. Il y'a encore des recherches à faire sur cette plante, qui est certainement différente de toutes celles que je connais dans les couches carbonifères.

Sur les échantillons No. 12 et 9. Je remarque un caractère rare dans les fougères, quoiqu' il y en ait quelques examples dans les *Neuropteris*, c'est la presence de pinnules naissant directement sur le rachis principal entre les grandes pennes latérales.

La foliole isolée du No. 2 me parait une de ces pinnules.

No. 3, 15, 19, tiges tres remarquables tout à fait nouvelles pour moi, le No. 3 est le mieux conservé et le plus caracterisé il presente deux tiges semblables qui se croisent.

Ce sont bien des tiges quoique tres applaties et ressemblant à des feuilles lineaires, car elles portent des cicatrices d'insertion d'organes appendiculaires tres regulières, disposées en spirale et en quinconce.

L'intervalle des cicatrices est lisse sans cannelure, stries, ni aréoles, comme on le voit dans quelques espèces de Sigillaria figurées dans mon Histoire des Vegetaux Fossiles; mais les cicatrices tres petites ont une forme tres différente, elles representent un petit disque ovale presque rond, dont la surface est finement granulie et sans cicatrice vasculaire bien distincte; il y a cependant un indice d'un faisceau transversal tres vague-

* The fossil above alluded to was referred provisionally to the genus Cyclopteris by the late Professor Edward Forbes, at the Meeting of the British Association held at Belfast in the year 1852.

ment marqué. La tige No. 3 qui n'est pas tres grosse moins d'un pouce en diamètre, presente ces cicatrices en spirale, tres reguliere au nombre de 4 ou 5 sur la demi circonference, soit de 9 environ sur la circonference entiere, et comme la série superieure alterne avec la série inferieure, deux tours de spires doivent comprendre 17 cicatrices, disposition qui se rapporterait à la spire $\frac{8}{17}$, et qui est analogue à cette de certains Lycopodes.

Mais les autres échantillons annoncent des tiges plus grosses. Sur le No. 15, la tige ne parait pas cependant comprendre plus de cicatrices, seulement elles sont plus espacées, quoi que de même dimension chacune, comme cela a bien sur une tige plus vigoreuse oú les feuilles, sans avoir leurs insertions plus grosses, les ont plus espacées.

Le No. 19 presente une tige encore plus grosse et à cicatrices plus nombreuses dans la circonference, environ 7 ou 8 dans une demi circonference.

Je ne connais aucune tige semblable à l'etat fossile, et ne puis la rapporter avec certitude à une famille connue—c'est un des fossiles les plus interessants à rechercher et à tacher de completer.

Ces tiges sont elles simples ou dichotomes? quels sont les organes inseris sur les cicatrices, sont ce des feuilles lineaires comme celles des *Lepidodendron?* les feuilles lineaires contenues dans les mêmes échantillons feraient elles partie de la même plante? Serait ce des racines comme les *Stigmaria?* je ne le pense pas, mais il y a beaucoup d'incertitude à ce sujet.

No. 1, 5, 8. Lepidophyllum.

J'ai designé sous ce nom des feuilles qui en général appartiennent aux lepidodendron, mais qui proviennent peut-etre aussi de plantes d'autres genres tels que les *Sigillaria*, ce sont de feuilles lineaires, etroites, uninerviées, et ordinairement carenées.

Celles de ces échantillons presentent ces caracteres, mais aucune n'est assez entiere, pour qu'on puisse apprecier leur longueur totale, et la forme de leur extremité.

Elles ressemblent beaucoup à celles qui paraissent de la tige No. 14, et qui sont representées sur le dessin que vous m'avez envoyé, mais elles sont je crois beaucoup plus longues, et pourraient appartenir aux tiges precedentes.

Dans des feuilles d'une forme aussi simple, il peut y avoir une tres grande analogie entre des organes appartenant à des especes, à des genres, et même à des familles différentes, les différences seraient probablement dans la structure, ainsi actuellement il y a souvent dans les formes seules, une grande analogie entre les feuilles de plusieurs genres différents de conifere, et entre des coniferes et des Lycopodiacées.

La dimension de ces feuilles s'accorderait assez bien avec celle des cicatrices des tiges précédentes, et la forme arrondie de ces cicatrices ne serait pas un obstacle, car on en observe d'assez semblables sur des coniferes à feuilles planes lineaires.

No. 14 cet échantillon joint au beau dessin que vous m'avez addressé de la part du Professeur Haughton, donne une idée assez complette de cette plante remarquable.

La forme générale, celle des feuilles, et la disposition de ces organes sur la tige est celle des Lepidodendron. Mais les cicatrices d'insertion de ces feuilles, telles que je puis les observer sur une partie de l'échantillon No. 14, différent beaucoup de la forme ordinaire de celles des Lepidodendron.

Cependant en considérant qu'elles correspondent à des rameaux jeunes, encore couverts de leur feuilles, et ne sont pas de vraies cicatrices laissées sur la tige apres la chute des feuilles, on peut je crois regarder cette plante comme appartenant au grand genre Lepidodendron.

La différence entre les insertions des feuilles par les jeunes rameaux, les cicatrices des feuilles récemment tombées sur des rameaux plus agés, et celles des grosses tiges est tres grande, comme on le voit par les espèces abondantes dans certains terrains houillers.

Les feuilles resemblent beaucoup à celles des No. 1, 5, 8, mais elles sont beaucoup moins longues, et un peu plus étroites.

Je ne pense pas que ce puissent etre des rameaux du Lepidodendron minutum, dont les cicatrices paraissent plus courtes et plus rhomboidales. Je crois qu'on doit en faire une espèce speciale que je vous demande la permission d'appeler *Lepidodendron Griffithii.**

J'ai un échantillon d'Ecosse de *Burdie-house*, qui se rapproche plus qu' aucun autre de cette plante, mais les feuilles sont tombées, et la forme des cicatrices un peu différente.

Le dessin d'un fragment de *Lepidodendron minutum*, que comprend le grand dessin de M. Haughton, ne suffit pas pour déterminer les formes précises de cette espèce, et ce serait un de mes principaux desiderata d'avoir un bon échantillon de cette plante, dont les caractères fussent bien appreciables.

Les échantillons No. 4, 7, 17, 18, renferment des sortes de tiges sans aucunes cicatrices, qui paraissent avoir été epaisses et cylindriques et lisses à leur surface. Je presume que ce sont des petioles de fougères, et probablement d'apres leur grosseur du Sphenopteris Hibernica.

Dans les échantillons 1 et 10, il y a dans chacun un fragment de feuilles larges lineaires striées, qui paraissent analogues à cette du *Nöggerathia* ou *Pychnophyllum* (*Flabellaria borassifolia*, Sternb.) mais ils sont trop imparfaits pour avoir une opinion positive à leur egard.

Le No. 16 m'est tout à fait inconnu, et sa nature est tres difficile à apprecier—serait ce un rhizome comprimé de fougère ?

Je n'ose avoir aucune opinion sur un seul échantillon, qui offre aussi peu de caractères particuliers.

Cette revue des échantillons de Kiltorcan est, comme on le voit, tres

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* The fossil above named was discovered by Dr. Carte, and is in the Museum of the Royal Dublin Society, as are also all those from Kiltorcan, under the several Nos. referred to: specimens of which, bearing similar numbers, are in the possession of M. Brongniart.

peu propre à décider la question de la nature Devonienne ou carbonifere de ce terrain.

Specifiquement ces plantes sont différentes de celles du terrain carbonifere. Génériquement elles rentrent dans la même nature de vegetation; mais c'est aussi ce qui parait avoir lieu pour le petit nombre d'espèces connues du terrain Devonien.

Il parait qu'on a trouvé, il y a deux ans, en Allemagne à Saalfield en Thuringe un gisement de plantes fossiles Devoniennes, mais M. Unger qui a annoncé ce fait, n'a pas encore, que je sache, decrit et figuré ces plantes; il en a seulement donné une liste dans le Bulletin de l'Académie des sciences de Vienne, et comme presque toutes sont d'apres lui nouvelles, il est impossible de les comparer avec vos plantes d'Irlande, il faut attendre pour resoudre cette question intéressante: mais il serait à désirer que vous puissiez réunir le plus grande nombre possible d'échantillons de ce terrain, et surtout de cette localité de Kiltorcan, qui les presente dans un bon etat de conservation.

Je serai toujours à votre disposition pour les etudier, et les comparer avec ceux d'autres localités, que j'ai réuni dans les collections du museum de Paris.

J'ajouterai quelques mots relatifs aux échantillons des autres localités.

1°. *Tallow Bridge.*

Ces échantillons sont si imparfaits, qu'il est bien difficile de se former une opinion à leur egard.

Je doute beaucoup que le *Sigillaria dichotoma* soit une vraie *Sigillaria*, l'écorce manque partout, ainsi que des cicatrices nettes, c'est seulement le moule de l'axe ligneux, ou de la partie sous-corticale, et je croirais plutôt qu'il appartient à un *Lepidodendron*, dont les vieilles tiges dépouillées de leur partie corticale presentent souvent le même aspect.

Ce serait peut etre les tiges de la même plante dont le *Lepidodendron minutum** No. 3 serait les rameaux, le No. 4 presente une dimension et une forme intermediaire.

2°. *Environs de Ballycastle.*

1. Fragments indéterminables, l'étiquette porte '*ferns*' mais je n'en vois pas de traces.

2. Doonadoba.—Portion de fronde dichotome resemblant beaucoup au *Fucoides antiquus* des terrains de transition de Norvège. Je doute cependant qu' il y ait identité, la forme est un peu différente et on y remarque la trace d'une nervure mediane qui manque dans ce *Fucoides*.

3 et 4. Indéterminables.

5. Tissu ligneux assez bien conservé d'une dicotyledone gymnosperme conifere? ou peut-etre sigillarée? les fibres au microscope paraissent rayées.

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* This fossil was described and figured in a former Number of this Journal.

3°. *Killaghtee.*

1 et 2. Rien d'appreciable.

3. *Stigmaria ficoides*—échantillon tres imparfait mais certainement de ce genre.

Je voudrais pouvoir me former une opinion exacte, des diverses sortes de tiges representées sur le beau dessin de M. Haughton avec le grand *Lepidodendron*, mais les dessins les plus parfaits laissent toujours des points d'organization obscurs, car on ne peut pas y appliquer la loupe pour en juger les détails, des echantillons de ces diverses tiges auraient pour moi beaucoup d'intéret. Je remarque seulement que la Fig. 2 indiquée comme *Sigillaria dichotoma* diffère beaucoup des échantillons de Tallow Bridge envoyés sur ce nom, et ressemble d'avantage aux tiges No. 3, 15, 19 ci dessus décrites, seulement les cicatrices sont figurées en lignes transversales, et non pas en lignes obliques.

Le dessin de tige* avec des racines en *Stigmaria* m'a font grand plaisir, c'est une nouvelle confirmation des faits déjà observées qui etablissent que les stigmaria ne sont que des racines de grand végétaux arborescents, qu'on a généralement reconnus pour des Sigillaria,—il est à regretter qu'ici la tige ne soit pas conservée, dans une étendue suffisante pour que la forme de sa surface puisse etre etudiée : si on en retrouvait de semblables, il serait bien à désirer qu'on peut recueillir une portion de la surface de la tige, et un morceau des racines, en choisissant les parties les mieux conservées.

Je vous renouvelle Monsieur, en terminant cette longue lettre, l'assurance de l'intéret avec lequel je recevrai toutes les communications, que vous voudrez bien me faire relativement à vos plantes fossiles, et des efforts que je ferai pour vous addrèsser quelques renseignements satisfaisants à leur egard.

Je regrette beaucoup d'avoir dans le cas actuel été obligé d'exprimer plus souvent des doutes que des affirmations; le sujet est si difficile, et nos moyens d'investigation si imparfaits, que cela me servir à d'excuse.

Veuillez agréer Monsieur l'expression de mes sentiments les plus distingués.

Ad. Brongniart.

P. S. Veuillez avoir la bonté d'exprimer à M. Haughton tous mes remerciments, pour le beau dessin qu' il m'a addressé, et que je conserverai precieusement.

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* The fossil referred to by M. Brongniart was obtained in the gray sandstone at Mac Swyne's Bay, near Dunkineely, in the county of Donegal, and is at present in the court-yard of the Royal Dublin Society; and a translation of this communication was read before that Society in connexion with a paper on the Plants of the Yellow Sandstone, by Mr. Griffith, on March 27, 1857.

Dr. Griffith read the following—

EXPLANATION OF THE PRINCIPLE OF COLOURING, AS WELL AS OF REFERENCE TO THE COMPOSITION OF ROCKS BY LETTERS CONTAINED IN THE TABLE APPENDED TO THE LAST EDITION OF THE "GEOLOGICAL MAP OF IRELAND;" TOGETHER WITH THE ORIGINAL NOTES MADE IN THE YEAR 1847, RELATIVE TO THE COMPOSITION AND STRUCTURE OF ARKLOW ROCK AND OTHER IGNEOUS PROTRUSIONS OF THE COUNTIES OF WICKLOW AND WEXFORD. BY RICHARD GRIFFITH, LL. D., F. G. S. LONDON AND DUBLIN.

In preparing the last edition of my "Geological Map of Ireland," dated April, 1855, I appended a Table explanatory of the colours and letters adopted by me to indicate the character and composition of the several rocks which occur throughout the country, as far as my examination enabled me to do so; but as it would appear from several sheets of the Government Geological Survey of Ireland, lately published, on the scale of one inch to a mile, that differences occur in the views entertained by my friend Mr. Jukes and myself, in regard to certain portions of the numerous insulated patches of rock of an igneous character, which occur in certain continuous lines or chains throughout the lower Silurian schistose district of the counties of Wicklow, Wexford, and Waterford, I think it desirable at the present time to explain to the Society what is intended to be represented by the shades of red and purple which distinguish those patches from the general tint of gray, which indicates the position of the strata belonging to the lower Silurian period.

The different districts and insulated patches throughout Ireland which are tinted with carmine indicate the areas which, in my opinion, should be classed as granite; and the difference in the composition and ages of those rocks in different localities are shown by the letter U, and its adjuncts, as Ua, Ub, &c. The igneous protrusions, whether in the form of mountain masses, hummocks, bosses, or dykes, composed essentially of the minerals felspar and hornblende (the latter usually predominating), generally known by the name of greenstone and greenstone porphyry, are represented by a shade of deep-red and their varieties, by the letter X and its adjuncts, as Xa, Xb, Xf, &c.; while the several protruded masses composed chiefly of felspar, with occasional hornblende and quartz, varying from sub-crystalline to compact (for one variety of the latter of which (Xd) I have adopted Kirwan's term 'felsite' in my map), and which in Wicklow, Wexford, &c., are frequently associated with protruded greenstones and greenstone porphyries, are distinguished from them by the letters, though not by colour; but it should be mentioned that, partly owing to the smallness of the scale, four miles to one inch, on which my Geological Map has been published, and partly from want of sufficient leisure to make in detail all the necessary observations, I have been unable to distinguish on the Map numerous comparatively small ramifications, whether of the compact felspathic rock or of greenstone, which occur in the rocks which adjoin

the great protrusions of compact felspathic rock or of greenstone; hence all such have merged in the general purple tint, lettered Ya, Yb, Yc, Yd, Yf, &c., which indicates the rocks that, as a class, I have included under the term "metamorphic."

My opinion, when the examination of the districts was made, being that many of the more minute strings or irregular beds of imperfectly developed felspathic porphyry, or even hornblendic rocks, originated in the fusion or semi-fusion of a portion of the original schistose rock, during the period of igneous action, when the great protrusions of the greenstone and felspathic rocks took place; and it is solely in regard to the origin and nomenclature of a portion of the rocks tinted purple on my Map, in which any important difference occurs between my views as given on the Geological Map, and those of the Government geological surveyors as represented on their maps; and my opinions and doubts on this subject are contained in my original notes, written in the year 1847, relating to Arklow Rock, and the igneous protrusions of the country generally; and, indeed, at the present time, I entertain the same doubts of the propriety of classing and uniting certain sub-crystalline felspathic rocks with metamorphic strata. But still I apprehend, that too great an extension may be given by the geological surveyors to a class of rocks called *volcanic ash*, conceived by them to have been deposited contemporaneously with the formation of the rocks of the Silurian period,—as I possess many specimens of apparently schistose rocks collected within the limits of these tracts of volcanic ash, which appear to me to exhibit decided indications of a sedimentary arrangement, though altered in external appearance, and presenting the ordinary character of metamorphic schist; and it was this circumstance which induced me to describe the districts referred to as metamorphic; many of which cannot be distinguished from the admitted metamorphic schist which occurs in the vicinity of the granite boundaries of the counties of Wicklow and Wexford.

This is a subject well worthy of discussion in the field, where alone a satisfactory conclusion can be arrived at. We are all searching for truth, to arrive at which we have only to observe with care, and decide without prejudice.

In illustration of the foregoing observations I may mention, that during the last month (May), while looking over the rock specimens collected in the counties of Wicklow and Wexford during my last hasty geological examination of those counties just ten years ago, and also consulting my note-book, as well as the observations laid down on the Ordnance Maps, for the purpose of refreshing my memory preparatory to accompanying my friends, Mr. Jukes and Professor Haughton, on a contemplated excursion to a portion of that district,—I discovered, among other matters, a short note of my views relating to the composition and structure of Arklow Rock, with the opinions I entertained at the time respecting the igneous origin of the white felspathic rock, so prevalent in the counties of Wicklow, Wexford, and Waterford, called by me

compact felspar, but to which Professor Sedgwick's appropriate name of felstone has lately been applied by Mr. Jukes.

In the present state of the geological examination of the country, I think it desirable, however crude, to bring these notes, as made on the spot, before the Society, with a view to future discussion.

In the last edition of my Geological Map of Ireland I have not made any change in the divisions which, in 1847, I thought it best to adopt between the rocks which I believed to be undoubtedly of igneous origin, and those which presented a kind of mean between igneous and schistose metamorphic rocks, the greater portion of which are now classed by the geological surveyors as *volcanic ash*. And, although I do not mean on the present occasion to dispute this view, still, on looking over my notes and specimens, I am not yet quite a convert to it, at least to the full extent of the views entertained by Mr. Jukes, and his excellent corps of field observers.

The following are the notes written at Arklow, dated June 26, 1847:—

The most satisfactory and characteristic example of the igneous protrusions of the counties of Wicklow and Wexford is exhibited at the hills called generally *Arklow Rock*, situate about two miles to the south of the town of Arklow. At this place there are two abrupt hills which rise precipitously, one out of the sea on the east side, and the other from the schistose plain on the west.

If we commence our examination from the south-western point of the western hill called Rock Little, we find a remarkable though irregular vein of white or grayish-white porphyritic felspathic rock, traversing the slate rock in a north-east and south-west direction, where it crosses the road at the south end of Rock Little, and where it has been quarried; its breadth is about 80 feet, having metamorphic schist on the west side, and a protrusion of greenstone on the east: proceeding northwards, the vein expands, and is there quarried extensively, and when broken is used for repairing the roads. In some places the rock includes thick elongated masses of schist, which are highly metamorphic, and sometimes present the character of semi-porphyry.

About 300 feet northward from the first opening of the vein at the road, it presents the appearance of three distinct veins, each having vertical sides, separated from each other by interposed masses of metamorphic schist, which are stratified horizontally, and have a vertical cleavage. If in this place we make a section across the vein from west to east, we find first a vertical vein consisting of white felspathic rock, having a porphyritic structure, from its containing occasionally imperfect crystals of felspar, a few crystals of hornblende, and grains of gray quartz; this vein or branch is 16 feet in breadth; beyond it to the east is a rib of metamorphic schist, presenting the usual cleavage 14 feet broad; then a second vein of felspathic rock, similar to the first, 50 feet in breadth, again a second mass of metamorphic schist, 70 feet broad, beyond which is a vein of coarse-grained felspathic rock, 70 feet broad at the least, but to the north-eastward it may be considerably more;

this rock in hand specimens presents the appearance and structure of a rather fine-grained granite, being composed of grayish-white felspar, white mica, some crystals of hornblende, and some quartz; the blocks which have been quarried present large cubical or rather slightly rhomboidal masses, many of which would weigh upwards of a ton, some upwards of two tons. Notwithstanding the difference in the structure, it is probable that the three apparently distinct veins are the produce of one common root, and that the difference in the veins has resulted from the slower cooling of the large mass giving time before consolidation for the more perfect development of the crystals of felspar, &c.

Continuing our general section to the eastward, we find schistose rock dipping to the south-east, at an angle of 15 degrees, having a nearly vertical cleavage; it is highly metamorphic near its contact with the felspathic vein, but becomes gradually less so at a distance from it.

Continuing the section to the east, at a distance of about 200 feet from the last-mentioned granular branch of the felspathic vein, we come in contact with and cross the direction of the greenstone protrusion already mentioned, which at the road forms the eastern boundary of the felspathic vein, but which, taking a north-easterly course, cuts obliquely across the strike of the schistose rock. This greenstone continues in the same direction, forming the summit and eastern declivity of the hill of Rock Little. But before reaching the farm-house of Rock Little it descends into the earth and is lost.

At the house of Rock Little, unaltered schistose rocks are visible, dipping south-east at angles varying from 10 to 20 degrees, and I have no doubt that this schistose rock forms the base of the valley which intervenes between Rock Little and Rock Big.

The protruded mass of greenstone just mentioned is highly crystalline; it is composed of oblong crystals of white felspar, with a profusion of imperfect crystals of black shining hornblende, forming a very hard and beautiful rock.

At the forge which stands at the forking of the road at the southern end of the valley, between Rock Little and Rock Big, is a second protrusion of greenstone, which extends uninterruptedly along the line of the old Arklow road, in a north-easterly direction to the sea below the graveyard. This rock is not so coarse-grained as that first described; the felspar is visible, but crystals of hornblende are rarely fully developed. Ascending Rock Big to the eastward, we find a close-grained felspathic mass, similar to that which occurs in the protrusion already mentioned; but in this case it presents a rude columnar structure, the columns being four, five, or six-sided, inclining towards the N. E. at an angle of about 30°. Still continuing to ascend Rock Big to the eastward, the rock graduates into rather coarse-grained greenstone, the crystals of felspar and hornblende being tolerably well developed, but not so perfectly as that first-mentioned. Still continuing to ascend, the crystalline and unstratified rock presents a nearly horizontal tabular structure, and the different tables exhibit different characters: in some it is felspathic

bluish-gray, with crystals of hornblende, in others, dark bluish-gray, compact or splintery felspar without quartz. At the summit the rock is composed of a base of dark-gray compact felspar, with disseminated imperfect crystals of white felspar. Descending the declivity to the eastward, the base of the rock still preserves its dark-gray colour, but it becomes very fine-grained, and presents the character of clinkstone porphyry, being translucent at the edges.

This rock has been much quarried; it very much resembles the felspathic porphyry of Penmonmawr in Carnarvonshire, used for the pavement of London. Continuing to descend to the eastward, the same rock continues to the base of the steep declivity, where the surface rock presents a white colour, and is similar to that of the vein first-mentioned, but on this mass being quarried beyond the weathered surface, it presents the dark bluish-gray colour of the sub-crystalline felspar porphyry of the summit of the hill. Still continuing to descend to the eastward, the rock, which presents a white felspathic mass at the surface, is followed by dark bluish-gray compact felspathic porphyry, which extends nearly to the coast.

The cliff immediately above the strand is composed of a brown and apparently irregularly stratified mass of rock, dipping S. W., angle 80°, and presents a very doubtful character. At the base close to the shore, near the old mine adit, the rock consists of thin beds of black Lydian stone, passing into flint slate, in which graptolites have been discovered. At the adit a bed of breccia occurs, having a close-grained quartzose or hornstone base, with angular fragments of white quartz and some Lydian stone; but time did not admit of these rocks being examined with sufficient care. Leaving the section, and proceeding in a N. E. direction towards Arklow and the sea, we find the greenstone and columnar felspathic rock extends uninterruptedly from the forge in a north-easterly direction to the sea-shore, at the northern extremity of Rock Big, varying frequently from ordinary greenstone to the dark gray compact felspathic rock. On the sea-shore there is a rude façade of basaltic columns similar to, but more perfect than, those already mentioned, which are being quarried for the pier at Arklow; and the columnar structure is in consequence far less striking than it has formerly been, but it is still sufficiently visible. The most remarkable circumstance is, that these columns sometimes consist of a porphyritic felspathic rock, composed of dark-gray compact felspar, containing imperfect crystals of hornblende; while other portions of the mass are composed of splintery, fine-grained, dark-gray compact felspar, having a conchoidal fracture translucent at the edges, and in hand specimens resembles fine-grained quartzite.

The coast south of this columnar rock is composed of the ordinary amorphous unstratified rock, varying in character and colour, as already mentioned; but it is remarkable that the dark-gray rock is in one instance at least traversed by a vertical vein of white compact felspar rock, about 9 inches in thickness, exactly similar in structure to that first described.

On the whole, Arklow Rock consisting of Hills Big and Little, presents a fine example of an igneous protrusion, or perhaps succession of protrusions through the slate rocks; and the frequent variation in the structure and composition of the rock in different parts proves that similar rocks which occur in various parts of Wicklow and Wexford, intermixed with slate rock, are also igneous protrusions, though in many cases, owing to their ambiguous character and schistose structure, I have classed them with, and called them, metamorphic slates.

The quarry at Gorey may be instanced as an example, also Ask Hill, north of Gorey, where the porphyry and felspathic rocks are associated with greenstone, similar to that on Rock Little.

On the whole, the results of the examination of Arklow Rock leave no doubt on my mind as to the igneous origin of Tara Hill, and other hills and ridges of that district; but still there are several localities in which both porphyritic and felspathic rocks occur, so intimately associated with rock presenting a schistose structure as to render it doubtful whether they should be classed with igneous or with schistose metamorphic rocks, and I may mention Bennogue Hill, near Gorey, as an example.

Mr. Joseph Kincaid, Jun., exhibited, and read the following remarks on,—

A SECTION ACROSS THE COAL BEDS OF LEITRIM.

The paper which I have the honour to lay before the Society has reference to a section made through the Coal district of the county of Leitrim. It was taken in a direction nearly north and south across Lough Allen. The beds south of that Lake are almost horizontal, and north dip about 10°. Starting from the hills above the Creaghan Company's Iron Works, near the small Lake Lackagh, we pass over the red and white sandstone, or greenstone, in which occur thin seams of coal. These were formerly worked, but have been abandoned for some time. Descending then by the river that runs by the Company's furnaces, we have exposed a thick bed of shale, in which are the workings for ironstone. This is found in balls, and in the bed, the former uppermost, about five or six feet thick, and of great richness, and the latter immediately below, not so rich, but also very valuable. Beneath this, at the furnaces, occurs a seam of excellent fire-clay, which lies at the bottom of the shale. It is from eighteen inches to five feet thick, and the specimens of alum are from this seam. I also found some well-preserved Orthoceratites in the limestone nodules that surrounded this. These nodules are formed of thin coats or layers, and are generally of large size; but those I was able to split open generally contained these fossils. Below this occurs an impure limestone, called Calp,—this being, I suppose, a mere lithological distinction. In this I found many traces of Posidonomya.

Further to the west we come upon the limestone that is worked for the Company's furnaces. This is very hard and compact, and contains few fossils. I was only able to obtain a few small specimens of Atrypa.

On the other side of Lough Allen we again come upon the impure limestone, dipping in the same direction. This would seem to indicate a considerable fault in the Lake,—one, I should think, of six or seven hundred feet.

I have now to point out the principal peculiarity in the section, which is the occurrence here of a bed of gypsum, about five or six feet thick. It is of peculiar appearance, being thickly interspersed with crystals of Selenite, and lies on the impure limestone at the edge of the Lake. I do not know that the occurrence of a bed of gypsum in carbonate of lime has been noticed before; but Professor Jukes informs me that he has seen fossils converted into sulphate of lime, and full of Selenite, imbedded in the tertiary limestone of South Australia, and also in the recent limestone of the coral reefs.

The remainder of the section shows the shale, which is about 120 feet thick, and the sandstone which contains the seams of coal worked by the Crevylea Company for their Iron Works. The seat-rock, which corresponds with the under-clay of the English coal-measures, is here a hard, fine-grained sandstone.

DUBLIN NATURAL HISTORY SOCIETY.

FRIDAY EVENING, JUNE 12, 1857.

Professor W. H. Harvey, M.D., M.R.I.A., F.L.S., President, in the Chair.

The Minutes having been read and signed,—

Professor Kinahan read some notes—

ON A REMARKABLE VARIETY OF TRICHOMANES RADICANS (KILLARNEY FERN).

The form of this beautiful and well-known fern, which I lay before your Society to-night, was first brought under my notice by Mr. John Bain, the Curator of the University Botanic Gardens, and is peculiarly interesting, as affording an example, among the "Muscoid" ferns, of that form of monstrosity which is met with rather commonly in some genera of our native ferns, and for which I proposed the name of Laciniatum in a paper read before your Society in 1853. The departure from the normal form consists, as there stated, in a depauperation of the membranous portions of the frond, the more vascular portions remaining unaltered, and the frond being in consequence generally either scalloped at its edges, or reduced to a linear condition. The fructification is generally absent in this form.

The causes or conditions which give rise to it are extremely obscure. In Scolopendrium it is generally most prevalent in plants from a dry station, but in Trichomanes I find it prevails in plants from the very

wettest localities; for, since my attention was called to the form, I found, on examining a case of ferns, put up four years ago, that plants from a station of this kind, which I had then laid aside as young plants, have preserved their characters unchanged up to the present, nor do they show any appearance of fructification, though plants in the same case and from the same localities are loaded with fruit. These characters are permanent.

The plants exhibited were obtained by Professor Harvey some years back at Killarney, and have preserved their characters unchanged ever since. I may add, before concluding, that a careful examination of this fern, in its Killarney stations, has led me to conclude that the plants there are, so to speak, drawn up, and that the fact of the difference between them and those from Waterford and Glouin Caragh, as regards fructification and form of frond, are altogether dependent on a law which prevails among the ferns, that when the membranous portion of a frond is developed more than normally, it is so at the expense of the fructification. I may also add, that an examination of the Valentia Island station of this fern has convinced me that the plant has been introduced there.

The CHAIRMAN read a communication—

ON LONICERA XYLOSTEUM, AN ADDITION TO THE IRISH FLORA.

THAT well-known garden plant, which has been recorded as yet in only a few stations in England, *Lonicera xylosteum*, was found in 1852, in an undoubtedly wild state, at a great distance from cultivation, on the Kippard Mountain, in a copse near the Cabhole, about six miles from Mountmellick, by Mr. John Jessop, who forwarded this notice of its discovery.

PROFESSOR KINAHAN read the following letter from MR. G. V. DU NOYER, M. R. I. A., Associate Member:—

ON A REMARKABLE FORM OF ECHINUS LIVIDUS.

"*Dingle, Tralee, May* 21, 1857.

"MY DEAR KINAHAN,—The rough outline on the opposite page may give you some idea of an Echinus I found the other day on the rocks among seaweed, at the Coastguard station, Minard. I have taken possession of it, and intend giving it to the Natural History Society. As well as my memory serves me, I have not before remarked an Echinus of this particular shape; many of the creatures are four or five inches across, and proportionally high.

"Yours sincerely,

"GEORGE V. DU NOYER."

The specimen referred to was exhibited; its most remarkable characters were: the base, pentangular in outline; the summit, instead of being flattened, as in all the typical forms of *Echinus lividus*, is produced

to a point, so that its height nearly equals its transverse diameter. The arrangement of the pores and tubercles of the *ambulacral plates* are identical with that in specimens of *E. lividus* from Valentia Island, but the *ovarian plates* and *nucleus* differ from those of *Echinus lividus*, and are, on the other hand, identical with the form of these parts in *Echinus sphæra;* in fact, in many of its characters this specimen is intermediate between these two species.

The specimen sent up unfortunately wants the spines, so that it is doubtful whether it may not be a species distinct from either *E. lividus* or *E. sphæra*. An *Echinus lividus*, pentangular in form, is recorded in Forbes's "British Starfishes," page 168, but no details are given, and the pentangular *E. sphæra* is well known.

Professor Kinahan also exhibited a very fine living specimen of the spiny crossfish, *Uraster glacialis* (Link.), from Dalkey Sound, which had been sent to him by D. J. Corrigan, M. D., M. R. I. A. This specimen was remarkable for its colour, the species is common in Dublin Bay, in from 10–30 fathoms; its occurrence there was first recorded from a specimen presented to this Society by Dr. Corrigan in 1853. There is a very remarkable variety (?) of *Uraster rubens*, which occurs abundantly when dredging on the Kish Bank, which may be mistaken for this species, and which suggests the question whether two species have not been confounded under the name of *Uraster glacialis* in our lists. The characters of the papillæ around the spines at once marks out the true *U. glacialis;* in the variety spoken of the spines are perfectly naked, whilst in *U. glacialis* they are surrounded by a fleshy mass, crowded at its summit with numerous small spinules.

The Chairman, under the new rules, declared the following duly elected:—

Joseph Rees Greene, Associate Member.
William Kennedy, Limerick, Corresponding Member.
W. Lecky, Valentia, Corresponding Member.

The Session was then declared closed, and the Society adjourned till November.

ADDENDUM TO SUPPLEMENTAL DUBLIN LIST OF CRUSTACEA (SEE MEETING, APRIL 17, 1857). BY JOHN R. KINAHAN, M. B.

The Galathea referred to in the above list as *G. nexa* proves to be an unnamed species; it is therefore figured, and a further description of the species is appended; also a description of the new Iphimedia figured in the same plate, from a drawing furnished me by C. Spence Bate, Esq., F. L. S., who has kindly described the species, though too late for insertion in its proper place.

Galathea Andrewsii (*mihi*). Plate XVI., Fig. 8, *a, b, c, d.*

G. rostro brevi, 3–5 dentibus utrinque ornatis. Pedibus anticis rotundatis elongatis, angustis sparse tuberculatis, tuberculis spinos

sæpissime terminantibus. Chelis digitis parallelis, elongatis angustis ricto minute denticulato, apice adunco; maxillepedibus externis articulo secundo tertium æquante.

Habitat: "Sinum Maris Hibernicæ, 'Dublin Bay,' dictum."

This species combines the characters of the genera Munida and Galathea to a great extent: it manifestly belongs, however, to the latter genus. I have named it after William Andrews, M. R. I. A., whose researches into our native zoology and botany have so often been laid before this Society.

The characters of the narrowed, elongated hands, their comparative freedom from spines, the small size of the species, and the character of the beak, separate it from all described species. For further particulars concerning it, see Supplemental List: it is extremely common.

ON A NEW AMPHIPOD. BY SPENCE BATE, F. L. S.

PLATE XVI.

IPHIMEDIA (*Rathke, n. a.* XX.). I. EBLANÆ (*mihi*).

Head produced into a rostrum; antennæ unfurnished with secondary appendage, subequal; the last segment of the pereion and each of the three anterior segments of the pleon armed, lateral to the dorsal ridge, with two parallel rows of teeth.

The three anterior segments of the pleon each armed with a well-developed tooth in the median dorsal line.

[*I.* capite rostrato. Antennis simplicibus subæqualibus. Corporis segmentis 8–11, duabus dentium parallelium seriebus, lateraliter armatis, 9–11, forte dente medio dorsi, ornatis.]

This species differs from *I. obesa*, on which Rathke founded the genus, in several very important points. The rostrum is more incurved; the infero-posterior edge of each segment is more pointedly produced; but that which most strongly strikes the notice is the elevation of a well-developed tooth on the centre of the dorsal surface of each of the three anterior segments of the pleon; whilst on the next succeeding there is a prominence as if a tooth had been arrested in the course of development.

On each side of the dorsal centre there exists a tooth, formed by the projection of the posterior margin, of each of the three segments that carries a central tooth, as also the last segment of the *pereion*, on which a central tooth does not exist.

Lower down on each of the three anterior segments of the pleon a second row of similar teeth exists on the posterior margin, and the two posterior of these same have each the infero-posterior point produced into a tooth; those upon the third segment are all curved upwards.

The anterior pair of Gnathapoda (Fig. 5) are simple; the dactylos in this species is either rudimentary or fused with the preceding joint; the extremity of the leg is tipped with six strong hairs, curved and reversely ciliated (Fig. 5A).

The second pair (Fig. 6), as also the mandibles (Fig. 3), and other appendages of the mouth, offer no great difference from the same organs in *I. obesa.*

Telson (Fig. 7) single, notched at the apex. I have named it after the place of its discovery.

This crustacean was taken by Professor Kinahan from the gill cavities of *Rhizostoma Cuvieri* in Dublin Bay.

There is undoubtedly much to be learned of the habits of animals that are taken from deep water by the aid of the dredge; yet from what we do know I am inclined to think that the position in which *Iphimedia Eblanæ* was taken must have been one of accident rather than its natural habitat. I have never taken *Iscea Montagui* except on the back of a crab (*Maia squinado*); and the *Isopod Astacella longicorne* infests the spines of *Echinus sphæra.* But these are not parasitic in their habits, such as *I. Eblanæ* we must suppose to be, if its natural abode is within the walls of the gill cavities.

EXPLANATION OF FIGURES. PLATE XVI.

Fig. 1, lateral view; Fig. 2, dorsal; Fig. 3, mandible; Fig. 4, maxilliped; Figs. 5 and 5A, first gnathopod; Fig. 6, second gnathopod. Fig. 7, telson.*

DONATIONS TO MUSEUM, MAY 1, 1857.

Vere Webb Macnally, Esq.—One hundred specimens of native Lepidoptera. *Nephrops Norvegicus,* Dublin Bay.

William Andrews, Esq., M. R. I. A.—*Podiceps cornutus,* Lough Caragh, county of Kerry; eggs of *Sula bassana* and *Ardea cinerea,* county of Kerry; and breast-bone of *Grus cinerea,* shot in county of Kerry, and presented to this Society some time since by the late M. O'Connell, Esq., M. P.

JUNE 12, 1857.

George Victor Du Noyer, Esq., M. R. I. A.—*Echinus lividus* (a variety), Minard, county of Kerry.

Richard J. Ussher, Esq., Cappoquin.—Eggs of *Fregilus graculus, Otus vulgaris,* and *Coturnix dactylisonans,* county of Waterford.

W. M'Dougall, Esq.—A black egg of the black East India duck.

John Robert Kinahan, M. B.—*Portunus carcinoides* (new species), Valentia; *Pagurus Eblaniensis* (new species [?]); *Porcellana longicornis, P. platycheles, Galathea Andrewsii* (new species); *Homarus vulgaris, Crangon fasciatus, Hippolyte pusiola, Pandalus annulicornis, Palæmon squilla, P. varians, Mysis vulgaris,* Dublin; *Palæmon serratus, Palæmon Leachii,* Galway.

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* Eight specimens of this species were found by me swimming merrily in the gill cavities of a Rhizostoma, which had been driven ashore, after a high gale, at Merrion, county of Dublin, in the autumn of 1854. The specimens have been unfortunately mislaid, except that figured above, which is now imperfect.—J. R. K.

TO THE LIBRARY.

"Reminiscences of Ice Travels," by Captain M'Clintock, R.N., &c.; from Rev. Professor Haughton. "Canadian Journal of Industry," Nos. I. to VIII.; from the Canadian Institute, Toronto. "Transactions of Geological Society of Dublin," complete; from the Society. "Journal of the Royal Dublin Society," Nos. I. to VI.; from the Society.

The Rev. Professor Haughton's paper on "Pleurotomaria" has not been furnished to us in time for this Number.—Hon. Secs. D.N.H.S.

NOTES OF A VISIT TO MITCHELSTOWN CAVES.* BY E. PERCIVAL WRIGHT, A. B., M. R. I. A., DIRECTOR OF THE DUBLIN UNIVERSITY MUSEUM; HON. SEC. DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION. WITH SUPPLEMENTAL NOTES ON THE BLIND FAUNA OF EUROPE, BY A. H. HALIDAY, A.M., M.R.I.A., F.L.S., VICE-PRESIDENT OF THE DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

PLATE XVIII.

In the early part of August, 1857, Mr. Haliday and myself, when returning from an entomological tour in the south and south-east of Ireland, paid a short visit to the extensive limestone caverns near Mitchelstown, county of Cork, hoping to find them inhabited by some insect life. It is pretty generally known that various living animals have been discovered in the deep recesses of caves, and it is now nearly a century since the *Hypochthon* (*Proteus*) *anguinus* was found in the caves of Carniola, and since that time various insects have been discovered both in European and American caves. A list of the European species, through the kindness of Mr. Haliday, is appended to these Notes.

The large majority of these animals are found very far in the interior of the caves; in those of Carniola none were found within two miles from the mouth of the cave, far beyond the confines of light. Under such circumstances eyes would be quite useless to them, and, therefore, we find them absent, the animals being quite blind; to them the broad daylight acts like another ocean, and they keep themselves shut up in their mountain prisons, towards which the waves of light never roll. Though blind, they would never appear to stumble into this upper world, but, impelled by some controlling sense, they keep them in their native darkness, each cave having its own peculiar species, which, except there be some internal means of communication, never obtrudes itself into even the neighbouring caves.

This is a deeply interesting fact in connexion with the theory of single centres of creation, as here we have a species, its centre of crea-

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*Read before Section D at the Meeting of the British Association, Dublin, August 26, 1857.

tion, and the extent of its wanderings, all within the limits of one small district, resembling in this respect some of those plants and animals found on St. Helena and other islands, and nowhere in the world beside. The caves of Carniola were visited in 1851 by Schiödte, and he has subsequently published a very interesting account of his researches, and of the animals which he found in them, in the "Transactions of the Royal Danish Society of Science."* Other caves have also helped to swell the already large list of blind animals.

Mr. Murray, in a paper read before the Royal Society of Edinburgh, in April of this year,† quite commiserates with these poor creatures, and, writing of one of them, says:—"To our finite perception this insect's existence in its sphere of life would almost seem to be a mistake. It is one of the predaceous carnivorous Coleoptera, and unless we assume that it is provided with some special sense which compensates for the want of light and want of sight, it does not need much consideration to satisfy us that its hunt after its prey will be the pursuit of food under difficulties; and that it does not live on very full commons may be inferred from the state in which we find it,—the whole of the inside in any I have seen being shrivelled up into almost nothing. Still they live, therefore must be fed, and must, I think, be possessed of some special instinct or increased power in the other senses to enable them to procure the wherewithal." This subject is an interesting one, but one that, I fear, must always be involved in obscurity.

Mr. Murray, being anxious to find out whether any of these animals inhabited England, visited the extensive caves of Derbyshire, but, after a very painstaking exploration, informs us he found nothing blind but the Alleys.

Hoping better things of our Irish caves, Mr. Haliday and myself arrived at the entrance of the Mitchelstown Caverns on the 4th of August; they are distant from Cahir about an hour and an half's drive. The townland, Coolnagarranroe, lies in the valley which separates the Galtee and Knockmildown chains of mountains, the former constituting its northern, the latter its southern boundary. The prevailing rock at this extremity of the Galtees is conglomerate, which occasionally passes into sandstone, while that which composes the opposite chain of hills possesses a structure intermediate between that of sandstone and schist. The material of the interposed valley is compact gray limestone, and this rock in the townland just mentioned forms two small rounded hills, within both of which cavities of considerable magnitude exist; one has been known from the remotest antiquity, the other, which we were to explore, was discovered about four-and-twenty years ago by a man while engaged in quarrying for stones. A very interesting ac-

* "Transactions of the Royal Danish Society of Science," class of Natural and Mathematical Science. Fifth Series. Vol. ii. Copenhagen: 1851.

† See "Edinburgh New Philosophical Journal" for July, 1857. Edinburgh: A. and C. Black.

count of this cave, accompanied by maps and sections, will be found in the "Journal of the Dublin Geological Society," written by Professor Apjohn.*

We were not long in obtaining guides, who brought with them a large supply of candles, matches, &c. The extreme narrowness of some of the passages in the caves renders the presence of torches quite unbearable. Following the guides, who lived in a small cottage by the road-side, we proceeded for a short distance through a recently cut meadow, and by the side of a thorn hedge, profusely covered over with wild flowers, and then in a moment we found ourselves at the cave's mouth. A small iron grating, which closed the entrance, was soon opened, and for a season we bade farewell to the day.

Once within, we found ourselves in a narrow passage, about four feet wide, and thirty-three in length, and which gradually sloped till it ended in a vertical precipice many feet deep, down which we descended by means of a ladder. Advancing on, we arrived at the lower middle cave, upwards of thirty-five feet high; the roof was covered with small stalactites, the floor being strewed with large tetrahedral blocks of limestone; about the entrance of this cave some specimens of a Macrotoma (Podura, Linnæus) were running over the rocks; they appeared to be bewildered by the light when it approached, standing still, so that a quill was applied over the spot so as to catch one or two, but if this was not done dexterously, they quickly showed their powers of leaping. Only one specimen was brought home, more having been put into the pockets than came out, after the variety of creeping, stooping, and wriggling gone through. This specimen was too much rubbed to pronounce on the species with certainty; but if not *M. plumbea*, for which the size is perhaps too small, and the colour of the scales too bright, it may be one of the allied species which Gervais has enumerated.

The distance from the entrance in this cave was so small, and the numbers of the insect so limited, that it is not at all improbable that they had strayed in hither from the outer world; the species of the genus Macrotoma, and *M. plumbea* in particular, haunting rather dark, damp situations, under stones among moss at the roots of trees.

Going on still farther, we explored almost all the recesses of the cavern; at one time down precipices dangerous even to look at, then creeping for many yards along the ground, which was covered with a most delightful red clay, so very fine as to be like red paint; then along places where we could neither walk nor creep, but, lying quite flat, just manage to wriggle through, at which, if the guides saw one, from want of practice, not expert, they would kindly give you a slight pull, and make you feel all the horrors of being metamorphosed into a wedge.

However, the hope of seeing some fine Anophthalmus, and the possibility of finding some blind Niphargus when we reached the river, tempted us on, and we passed along some sloping precipices, that even

* "Journal of the Dublin Geological Society" for 1835.

the memory of being once over them is not pleasant. At the farthest end of the long cave we discovered a species of the same group as the one just mentioned, but one that was a true denizen of darkness, and a veritable inhabitant of these caves. This was a Lipura, somewhat larger than *L. fimetaria*, which abounded on the surface of some little pools formed by the drippings from the roof collected in hollows of the bottom. They clustered especially on floating lumps of soft calcareous concretions, and were also abundant on the moist rocks of the sides of the caves, especially about some dusky stains of the encrusted rock. The surface of these stains was scraped, but after being dried the matter appeared to consist chiefly of fine earth, with a smaller proportion of vegetable granular matter, apparently the first stage of some algoid growth, presenting no filaments or other trace of regular organization.

This Lipura is almost identical with the species which Schiödte found in the Adelsberg Grotto on clumps, especially of *Byssus fulvus*, L. (*Azonium fulvum*). There are, however, some points in which his description does not exactly agree with the specimens from the Mitchelstown Caves, and, as mentioned before, different caverns in the Carniola and Hungarian series afford distinct species of such coleopterous genera, as Anophthalmus, Leptodirus, and Adelops; so it is by no means improbable that the only known inhabitant of our caves may be peculiar to our own country.

The true specific distinctions, however, in this long neglected group of insects, are scarcely so well understood as to induce us to propose a new specific name for it on the ground of the apparent difference between our Lipura and Schiödte's. I now give Schiödte's brief description of his *Anurophorus stillicidii*, and of the circumstances under which he found it.

"In the clumps of *Byssus fulvus*, which grow in the interior space of the Adelsberg Grotto, I found a remarkable new species of the order Thysanura. It is snow-white (Plate XVIII., Fig. 2, *a*), of pretty considerable size, and by the absence of a coat of scales, by the rudimentary leaping apparatus, and the structure of the antennæ and limbs, as well as by the number and position of the eyes, is allied to the genus Anurophorus of Nicolet. The Grotto species is distinguished very strikingly from the few others of this genus that are known, by the antennæ, which are longer than the head, as well as by the longer and more slender legs, but especially by the structure of the thoracic segments, which are divided into two parts of unequal dimensions.* The eyes are extremely difficult to discover; and it was not until after many vain endeavours that I succeeded in ascertaining the presence of them, their number, form, and position, by means of a Lieberkühn's speculum and a strong reflected lamp-light. They are snow-white (see Plate XVIII., Fig. 2, *d*), fourteen on each side, and disposed nearly as in *Anurophorus fimetarius*. —(Nicolet, 'Recherches, pour servir a l'Histoire des Podurelles,'

* Vide "Transactions of the Royal Danish Society of Science," as before.

Plate II., Fig. 10.) The colour evidently proves them rudimentary, and unsuited for the function of the sense. Along with the larger specimens, others were found in company (Plate XVIII., Fig. 2, *b*), which, besides their inferior size, differed by having shorter antennæ, with a stout terminal joint, and the thoracic rings less strongly divided: these I take to be younger specimens. Along with these two kinds was found also a third (Fig. 2, *c*), much smaller, of linear figure, with very short antennæ, but faint traces of a division of the thoracic segments, and having the end of the abdomen armed with two small hooks. I think it probable that this small kind are the larvæ."*

Of the specimens brought home from the Mitchelstown Caverns, a good number were in excellent preservation, and some were yet alive when brought to Dublin. It was unfortunately found impossible to pay any attention to them until a fortnight had almost passed; and by that time their bodies were completely dissolved away. A few specimens, preserved in alcohol, were therefore all that remained, and these were very carefully examined by Mr. Haliday, who obligingly gave me the following particulars:—

"The specimens being preserved in alcohol, those who know the fragile and watery consistence of insects of this group must be aware that some of the characters of external form, and all those of internal organization, are liable to be somewhat altered or effaced by keeping. Of those few preserved, only one specimen† appeared to be quite mature; that is, having the antennæ nearly as long as the head, and with the last joint longer, indeed, but not thicker than the rest. The majority were in the penultimate state, when the antennæ are shorter, with the last joint stouter, and the subdivision of the thoracic segments, as Schiödte states, is less marked. The length of limbs suited his description pretty well, but the thoracic segments presented no such strong stricture across the middle (dividing the portions representing scutum and scutellum of each dorsal plate) as Schiödte has described and figured. The anterior part of the mesothorax and metathorax did appear, as in his, broader than the posterior; but this arose rather from the prominence of the episternal region than from any extraordinary inequality in the development of the dorsal region.

"Accurate as Schiödte has proved himself in regard to those branches of which he has made a particular study, it may be pardonable, in the present instance, to suggest a possibility of error, if not in his observations, yet in the interpretation of them, as affecting the limits of the several thoracic segments, which he seems to have thrown too far back by half a segment in each instance; at least, such a comparative development of the prothorax as he attributes to his *Anurophorus* is at variance with the usual structure in this family.

"Another important and more unequivocal difference is that in our

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* "Contribution to the Subterranean Fauna." By J. C. Schiödte. P. 1–39, Plates I.–IV.

† Vide Plate XVIII., Fig. 1.

specimens, whether examined by reflected light, or by transmitted light, after cutting out the lateral portion of the integuments of the head, and clearing it of its internal contents, not the *least trace* of eyes could be discovered, whereas, Schiödte detected in his *fourteen* ocelli at each side arranged as in *Lipura fimetaria*, but quite white, from which he concludes that they are useless for vision. It seems singular to find, in that case, a perfect and normal development of cornea, such as he represents, without any formation of pigment behind it; but as Schiödte has stated the many fruitless endeavours he had first made to discover these organs, and the manner in which he at last succeeded, I am precluded from supposing any error of observation on his part, and am compelled to consider the difference a strong argument for the specific distinction of the Lipura of the Irish caves from that of Adelsberg. While in the former not the least evidence of the presence of eyes could be detected, the Macrotoma found in the same caves, nearer the entrance, had these organs quite distinct, so that it could by no means be confounded with the allied genus Tritomurus of the Austrian caves, which is destitute of eyes, and presents a different form of the saltatory fork. In the Lipura the saltatory apparatus is quite obsolete, as Schiödte has described it (except in the youngest form, where two small crooked spines appear as a rudimentary trace of the posterior fork); and the mandibles are sufficiently apparent to exclude it from Achorutes. As usual, the foot consists of a single claw, but inside this is a stout curved bristle of about equal length, which doubtless co-operates with the claw, and supplies, in some measure, the want of a second claw. The usual mamilla, or tube, under the first neutral segment is well developed, projecting backwards under the base of the second. The colour of the insect is a uniform opaque white, the length little more than a line."

The reasons for altering the generic name from Anurophorus, under which Schiödte characterized it first, to Lipura, will be found in Gervais' 'Insectes Apteres,' who has justly remarked that Anurophorus of Nicolet ("Recherches pour servir à l'Histoire Naturelle des Podurelles") is equivalent to, and later in date than, *Lipura* Burmeister ("Handbuch der Entomologie," vol. ii.).

We have in this country two other *white* species of *Lipura;* the common *Lipura fimetaria* (*L.*), which is found under stones in damp places, common enough; and another which lives under stones in the bed of the sea, uncovered at low water, in company with, but very much rarer than, *Achorutes maritimus.*

Mr. Haliday informs me of several errors into which Gervais has fallen as to the synonyms of the former of these species, either from negligence or want of judgment. "In the first place he has chosen the trivial name of *ambulans*, identifying it with *Podura ambulans* of Linnæus, which, from the express character given, '*furca extensa*,' can hardly be anything else than the *Campodea staphylinus* of Westwood. The binary number of appendages to the tail doubtless determined Linnæus to refer this insect to Podura, while Otho Müller, with a juster appreciation of affinities, made of it a *Lepisma* (*L. minuta*, 'Zoologicæ Danicæ Prodomus'

No. 2160), although he has also a *Podura ambulans*, a circumstance which may seem to throw some doubt on the application I have made of the other. Had Gervais taken the trouble to *examine* the description of Linnæus, with this result he would, perhaps, scarcely have thought it worth while to provoke a controversy with Mr. Westwood in print about priority of nomenclature in this case.

"Secondly, he cites as another synonym *Podura alba*, Linnæus (a name not to be found in the 'Systema Naturæ'), instead of *P. fimetaria*, giving to Schranck the paternity of the trivial name *fimetaria*, which would thus appear to be comparatively of late date, instead of being, as it is in fact, the earliest trivial name, dating from A. D. 1758, and the tenth edition of the 'Systema Naturæ.'"

Near the Garret Cave, while engaged in turning over some stones, I found the skeletons of several bats. I think it possible they may be those of our common *Plecotus auritus*. The skeletons do not appear to be of very ancient date, and as this portion of the cavern is the nearest to the surface, it is quite possible that there may be some slight communications with the open air.

In conclusion, I would hope that at some future time both these caves and the similar ones of Dunmore will be examined with still greater care than has yet been bestowed upon them. Even in the Mitchelstown Caves there are numerous spots quite unexplored, and, perhaps, the river, which in all probability could be approached from both sides of the cavern, might, if carefully examined throughout its entire length, yield some blind Crustacea. I attempted to wade it, but its icy coldness and the rapid deepening of its stalagmitic strand prevented me going in far.

Mr. Haliday remarked that while some species of cave insects appeared to be peculiar to separate caverns, or only in common to those which were so situated that an unexplored communication between them seems not improbable, there were others, and among them the *Lipura stillicidii*, which had a wider range, having been observed in most of the caves of the Austrian territory that have been investigated. It was, therefore, not so improbable as it might at first appear, that the same species should be found in the caves of the British islands. Mr. A. Murray had attempted to explain the absence of a subterranean Fauna in the Derbyshire Caves which he had searched, by their inferior depth; but this alone would scarcely be a sufficient reason why we should not look for some more discoveries in them by a closer examination. Though we have no subterranean passages to compete with the famous Mammoth Cave of Kentucky, or even with the Baradla Cave in Hungary, which is nearly four English miles in length (only a third of that extent, however, being accessible except in particularly dry seasons), yet some of the Derbyshire Caves exceed in length the celebrated grotto of Adelsberg, the best known and richest locality of the subterranean Fauna. Some of the Austrian cave insects, too, occur in caves of but a few yards in

depth. The list which Mr. Murray has given in his paper on "Insect-Vision and Blind Insects" admits of being now enlarged by various additions made since it was written. The following list, in like manner, is sure to be soon antiquated by the results of the investigations so diligently prosecuted by the Austrian naturalists. In this list the letters H. and M., affixed to some of the localities, denote respectively, Hungary and Moravia, provinces which have been but recently investigated in this point of view. The asterisk prefixed to a genus denotes that it comprises other species not exclusively subterranean; the like before the trivial name, that the species has occurred in other dark situations out of the caves, though it must be considered as properly belonging to these. It is to be remembered that the caves also contain an immigrant Fauna, still more numerous than the aboriginal (which latter alone is regarded in this list), composed of species which stray into them from the outer world, or which are transported thither by the rivers that traverse some of them. This nomade population is rarely absent, and in many cases penetrates into the deepest recesses. Several species of bats (*Vespertilio murinus*, *Rhinolophus ferrum-equinum*, *Miniopterus Schreibersii*, &c.) and pigeons find a retreat in these gloomy halls, often in countless multitudes. Frogs (*Rana alpina*, *Pelobates fuscus*) and newts (*Triton cristatus*) also occur. But the insects are much the most numerous, and even winged kinds (*Anthomyia*, &c.) penetrate the murky depths far beyond the last glimmerings of shadowy twilight.

LIST OF THE RECORDED SUBTERRANEAN FAUNA OF THE EUROPEAN CAVES.

VERTEBRATA.

AMPHIBIA.

SIRENIDÆ.

Hypochthon *Merrem.*

anguinus *Laurent.* Magdalena Grotto, near Adelsberg.

ANNULATA.

INSECTA.

COLEOPTERA.

CARABIDAE.

Anophthalmus *Sturm.*

schmidtii *St.* Luegg. Pasiza.

bilimekii *St.* Sele; Adelsberg; Gottschee.

scopolii *St.* Setz, near Adelsberg.

hacquetii *St.* Krimberg.

hirtus *St.* Krimberg; Podlas.

redtenbacheri *Frivaldsky.* Igritz etc. (H.)

*Pristonychus *Dejean.*

schmidtii *Miller.* Luegg and other caves of Carniola, Illyria, etc.

SILPHIDAE.
Leptoderus *Schmidt.*
hohenwartii *Schm.* Adelsberg; Karst; Merzla jama.
angustatus *Schm.* Goba.
sericeus *Schm.* Volcja-jama.
(fourth species) *Schmidt.* . . . . . .
Pholeuon *Hampe.*
angusticolle *H.* Vuntsassze (H.)
leptodirum *Frivaldsky.* Funacza (H.)
Oryotus *Miller.*
schmidtii *M.* Volcja-jama.
Drimeotus *Miller.*
kovacsi *M.* Igritz (H.)
kraatzii *Frivaldsky.* Bone cave of Fericse.
*Adelops *Tellkampf.*
milleri *Schmidt.* Passica Grotto; Mokritz Berg.
*khevenhylleri *Miller.* Adelsberg; Gabrovica; Fernece; Dolga-jama.
freyeri *Schm.* Dolga-jama; Ihausca; Postovka.
globosus *M.* Ledenica.
byssinus *Schm.* Adelsberg; Volcja-jama.
acuminatus *M.* Treffen.
*montanus *Schioedte.* Luegg.

PSELAPHIDAE.
Machaerites *Miller.*
spelaeus *M.* Struge.

STAPHYLINIDAE.
*Homalota *Erichson.*
spelaea *Erichson.* Adelsberg.
Glyptomerus *Mueller.*
cavicola *M.* Cave near Aich.
Typhlobium *Kraatz.*
*stagophilum Kr. Gross Kahlenberg.

CURCULIONIDAE.
Troglorrhynchus *Mueller.*
*anophthalmus *M.* Gross Kahlenberg; Mokritzberg.

NEUROPTERA.
GRYLLIDAE.
Phalangopsis *Serville.*
cavicola *Kollar.* Luegg.

PODURIDÆ.
Tritomurus *Frauenfeld.*
scutellatus *Fr.* Caves of Carniola and Illyria.
Lipura *Burmeister.*
stillicidii *Schioedte.* Caves of Carniola, Illyria, (and Ireland ?)
(Another species of Podura) *Wankel.* Slauper (M.)

DIPTERA.
PHORIDAE.
Phora.
aptina *Schiner.* Adelsberg.

ARACHNIDA.
ACARI.
IXODIDAE.
*Haemalastor *Koch.*
gracilipes *Frauenfeld.* Skednenza in Mokritzberg. Baradla (H.)
Eschatocephalus *Frauenfeld.*
gracilipes *Fr.* Adelsberg; Schischka. Agdelek. Catherine cave (M.) Baradla (H.)

OPILIONES.
PHALANGIDAE.
Phalangium.
cancroides *Schmidt.* Siavka.

SOLIFUGA.
OBISIDAE.
*Obisium.
longimanum *Kollar.* Adelsberg; Pasiza.
Blothrus *Schioedte.*
spelaeus *Schioedte.* Adelsberg; Volcja-jama.
(second species) *Schmidt.* Volcja-jama; Krimberg.

ARANEAE.
DYSDERIDAE.
Stalita *Schioedte.*
taenaria *Sch.* Adelsberg. Béziskala (M.)

MYRIAPODA.
CHILOGNATHA.
POLYDESMIDAE.
*Polydesmus.
subterraneus *Kollar.* Adelsberg. Stauper (M.)

CRUSTACEA.
ISOPODA.
ONISCIDAE.
Titanethes *Schioedte.*
albus *Koch.* Caves of Carniola, Illyria, etc., common.
Two species more of this Family, unnamed.

AMPHIPODA.
GAMMARIDAE.
Niphargus *Schioedte.*
stygius *Sch.* Caves of Carniola, Illyria, &c.
aquilex *Sch.* Deep wells in England.

ANNELIDA.
CHAETOPODA.
HIRUDINIDAE.
Typhlobdella *Diesing.*
kovaczi *Diesing.* Baradla (H.)

MOLLUSCA.
GASTROPODA.
AURICULIDAE.
Zospeum *Bourguignat.*
spelaeum *Rossmassler.* Adelsberg.
lautum *Frauenfeld.* Krimberg; Glaven; Pasiza.
aglenum *Bourg.* Pasiza, etc.
obesum *Frau.* Obergurk.
nycteum *Bourg.* Pasiza.
schmidtii *Frau.* Pasiza; Globok potok; St. George.
pulchellum *Freyer.* Krimberg.
costatum *Fr.* Goricana.
alpestre *Fr.* Dioja grica; Veternica; Dolga-jama; Skedenza.
nyctozoilum *Bourg.* Do. Do.
frauenfeldii *Freyer.* Podpec. Skedenza near Reinturnam, etc.
amoenum *Frau.* Pasiza.
freyeri *Schmidt.* Bratenea, etc.
reticulatum *Hauffen.* Bidou sturm; cave near Laak.

PALUDINIDAE.
*Paludina *Lam.*
pellucida *Hauffen.* Glaven; Goerzah grotto.
*Valvata *Mueller.*
erythropomatia *Hauffen.* Goeritza grotto.

HELICIDAE.
*Helix.
hauffeni *Schmidt.* Duplice; Jelince; Malbukuje; Obergurk; Podpec.

ON THE ACALEPHÆ OF DUBLIN COAST, WITH DESCRIPTIONS OF SEVEN NEW NAKED-EYED FORMS. BY JOSEPH R. GREEN, HON. SEC. DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION; ASSIS. SEC. ROYAL ZOOLOGICAL SOCIETY, IRELAND.*

If we take any group of living beings and carefully observe the several species which are found in any given locality, considerable service will be rendered to science. This more especially applies to the Acalephæ, the distribution† of which interesting class has hardly received from naturalists the attention which it deserves. "Pelagic as these animals are, there is reason to believe that the range of the species is extremely limited, and that they afford a valuable means of defining zoological provinces in the open sea."—(Professor E. Forbes's "Report on Egean Invertebrata," 1843.)

The Acalephæ of the Irish shores have as yet been but little investigated, and it is highly probable that many rare and beautiful forms yet await the notice of some patient observer.

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* Read before Section D at the Meeting of the British Association, Dublin, August 26, 1857.

† Many details, too, in connexion with the development of several of these forms have only recently been brought to light, and our knowledge of their history is still incomplete. Any classification of them in accordance with their real nature would probably be considered premature. I, however, wish it to be understood that I agree entirely with the views of Dr. Carpenter and others as to the true position which the Discoid Medusæ ought to occupy, and that they are not to be regarded as distinct animals, but rather as the reproductive zoids of certain zoophytic structures. The discovery of the beautiful analogy which exists between the flower-bud of a plant and the Medusoid of a Zoophyte may justly be regarded as one of the most important steps which zoological science has recently made. A modification of the above view is proposed by some naturalists, who consider the Gymnophthalmata as divisible into two groups, namely—1. True Naked-eyed Medusæ, as Willsia, Thaumantias, which produce ova, to be developed into the likeness of their parents by continuous reproduction. 2. Medusoids, which are merely generative zoids, as Steenstrupia, Cladonema, &c. But such a separation is unsupported by facts, for no instance of a Discoid Medusæ having been produced without the intervention of a Zoophyte has yet been established. Moreover, the figures of the Medusoids developed from some of the Campanularidæ, as observed by Van Beneden on the coast of Ostend, are stated by Professor Forbes to bear a striking resemblance to Tima and Geryonia, which, certainly, cannot be ranked among the lower forms of the group; nor can any essential difference be shown to exist between the forms thus widely separated from one another. It is true that many observations are still wanting before the evidence in favour of the necessity of entirely altering the present system of classification can be considered complete; and the abolition of a large group of animals is a step of too serious a nature to be carried into execution without much careful consideration. But there can be little doubt that the researches of future observers, if properly conducted, will ultimately show the necessity of such an alteration. Meanwhile, we are not to refrain from recording the forms which present themselves to our view, nor even to give those a name, even though we should feel sure that the latter must eventually be done away with. These remarks are appended lest it might be supposed that I attach a false value to the description of species as given in the text. With regard to the Ctenophora, there can be little doubt as to their affinity with the Actinozoa; not only their development, but also their anatomical structure, entitle them to be ranked as a distinct class parallel with the Actiniadæ.

The following is a list of the species which I have hitherto obtained on the Dublin coast:—

ORDER DISCOPHORÆ.

SUB-ORDER I.—STEGANOPHTHALMATA.

Rhizostoma pulmo.
Cassiopœa lunulata.
Aurelia aurita.
Aurelia campanulata.
Cyanea capillata.
Cyanea Lamarckii.
Chrysaora hyoscella.

SUB-ORDER II.—GYMNOPHTHALMATA.

Family Equoreadæ.

Stomobrachium octocostatum.
Equorea formosa (*n. s.*).

Family Geryoniadæ.

Geryonopsis delicatula.
Thaumantias neglecta (*n. s.*).
Thaumantias Thompsoni.
Thaumantias typica (*n. s.*).
Thaumantias inconspicua.
Thaumantias lucifera.

Family Sarsiadæ.

Sarsia tubulosa.
Bougainvillea Britannica.
Bougainvillea dinema (*n. s.*).
Diplonema Islandica (*n. g.* and *s.*).
Steenstrupia Owenii (*n. s.*).

ORDER SIPHONOPHORA.

Agalmopsis elegans.

ORDER CTENOPHORA.

Beroe cucumis.
Cydippe pomiformis.
Cydippe pileus.
Mnemia Norvegica.

Twenty-five species are here enumerated. The above, for a local list, can by no means be regarded as scanty, for Professor E. Forbes, after careful exploration of the Egean, observed but eighteen species in that region. Every British species of Steganophthalmata, except Pelagia, is here mentioned. The *Cassiopœa lunulata* is given on the authority of my friend, Mr. E. Percival Wright; with this exception all the species enumerated in the above list have been observed by myself. I have captured, in Belfast Bay, two species of Thaumantias not found on the Dublin coast, namely, *T. lineata*, and a new species, *T. Pattersonii*.

I shall reserve my remarks on the Steganophthalmata for a future occasion, and for the present confine myself to the naked-eyed forms alone. Since the publication of Professor E. Forbes's monograph, about twenty additional species of these beautiful animals have been found on the British shores. Agassiz has studied their distribution on the coast

of North America, while the Mediterranean seas have yielded valuable results to more than one able observer. To the researches of Leuckhart and Gegenbaur we are particularly indebted. The former, in his "Notes on the Medusæ of the Seas of Nice" (Wiegmann's "Archiv," 1856), describes ten new naked-eyed species, six of which belong to established genera, and are named as follows:—*Thaumantias corollata*, *Oceania coccinea*, *Euphysa globator*, *Steenstrupia lineata*, *Cunina moneta*, and *Cunina costata*. The four remaining species are made into as many new genera: namely, *Phialidium viridicans* (which bears some resemblance to Thaumantias), *Calyptra umbilicata*, *Pyxidium truncatum*, and *Paryphasma planiusculum*; all four presenting novel and remarkable varieties of structure. Gegenbaur's paper ("Zeitschrift füer Wissenschaftliche Zoologie;" Siebold and Kolliker: Leipzic. Vol. viii. 1856) is, if possible, still more interesting, containing not merely an account of several new species, but also an original method of classifying these animals. His arrangement of the families and genera differs from that of Professor Forbes; and there can be no doubt that the discovery of many additional forms must materially alter our views of the classification of the present group. For the name Gymnophthalmata, employed by Forbes, the term Craspedota is substituted. A reference to both of these papers will well repay perusal.

To revert to the British species: Forbes, in his description of the *Stomobrachium octocostatum*, states his regret at not being able to submit the specimens which he captured in 1839 to a sufficiently careful examination. Since that period he had never again met with it. In the summer of the present year I was so fortunate as to procure a specimen of this beautiful Acalepha. The umbrella is campanulate and convex, more pointed than in Professor Forbes' figure, and so transparent that to all appearance the sub-umbrella seems to form the true outline of the animal. The sub-umbrella is about half the length of the umbrella, but is more depressed than the latter, so as not to correspond with it in shape: it is bordered by a marginal vessel and veil. The vessels are eight in number, simple, of a pale-yellow tint. The ovaries were leaf-like, furbelowed, short and broad, not so linear, as in Professor Forbes's figure; of a bright golden yellow hue, very conspicuous. They were situated along the course of the radiating canals, near the peduncle. This last was yellowish, nearly circular, very simple, short and fimbriated. Round the margin were 40 ($8 \times 4 + 8$) tentacles, highly contracted, presenting a pilose appearance under the microscope, springing from rather large, though not very conspicuous bulbs. Between each of these was a smaller tentacle, at the base of which an otolitic vesicle seemed to be placed. This Medusa was nearly half an inch in length. Its favourite position seemed to be when it balanced itself in the water by means of its smaller tentacles, and then curved backwards, and extended the larger ones. Nothing can be conceived more elegant and graceful than this posture: the tentacles reached upwards to more than five times the height of the umbrella, becoming finally so delicate as to be completely invisible.

I have no special remarks to make on the other naked-eyed Medusæ

above mentioned, save with regard to the seven new species, which I shall now proceed to describe.

EQUOREA FORMOSA, *n. s.* (*mihi*). Plate XIV., Fig. 2, *a.*

Subsequent to the publication of his monograph (in which no species of Equorea is mentioned), Professor Forbes, in Nov., 1851, read a paper before the Zoological Society of London (*vide* "Proceedings" for 1851), "On a new species of Equorea inhabiting the British Seas." This he termed *E. Forskalii.* It differed from all other British naked-eyed Medusæ, both by its large size (6 inches in diameter) and also the great number (136) of its radiating canals. Mr. Gosse, in his "Devonshire Coast," describes two other species, in which the vessels were not quite so numerous; and I have now to add a fourth, in which their number is reduced to ten.

The umbrella of this Medusa is slightly convex, depressed, smooth, and beautifully transparent, from one-third to half an inch in length, and the same in diameter at its orifice; sub-umbrella occupying nearly half the length of umbrella, traversed by ten simple vessels, which though colourless, are easily recognisable by the naked eye. A marginal vessel and veil border the sub-umbrella. Peduncle short and wide, of a very pale-brown colour, fringed at its edge, ten-lobed, and nearly circular; the stomach in this animal was in fact almost an open cavity, sixty tentacles surrounded the margin, each springing from a minute bulb. Two only of the vessels were provided with ovaries. These were leaf-like, of a pale-brown hue, placed very near the base of the stomach. When living, this Medusa formed a most beautiful and attractive object. To the naked eye it seemed almost perfectly colourless; its tentacles were exceedingly elastic, at one moment extending to two inches in length, the next contracted into little wart-like nobs. Its movements were active and vigorous. At first I was of opinion it might be the young of some larger species of Equorea, but an examination of many specimens has now convinced me that it is worthy of being ranked as a separate species.

THAUMANTIAS PATTERSONII, *n. s.* (*mihi*). Plate XIV., Fig. 3, *a.*

I have named this species after Mr. Robert Patterson, of Belfast, whose book on "Zoology for Schools" has so largely contributed to the extension of zoological science, and whose papers on Cydippe and Bolina form so valuable a contribution to the history of our native Ciliogradæ.

The present animal is allied to *T. melanops*, corresponding with it in the general shape of its umbrella, &c. The margin was bordered by 208 tentacles. At eight equidistant points these were interrupted by as many abortive bulbs, each containing a conspicuous black ocellus, reminding one of the cysticles in *Aurelia aurita.* The peduncle was long, terminating rather abruptly in four broad lips. The ovaries were very linear, of a pale-brown hue. Parasitic on these was a small species

of leech, agreeing in all respects with the *Monopus medusicola* found by Mr. Gosse on *Willsia stellata* (*vide* "Ann. Nat. Hist." for 1855). Two or three of these leeches occurred on each ovary. This was a hardy species of Thaumantias: five out of seven specimens captured in Belfast docks lived in captivity for a fortnight, having in the meantime borne a journey from that city to Dublin. They were gregarious, great numbers occurring in the above locality, so that I was thereby enabled to subject several individuals to examination. This Medusa varies from one-third to two-thirds of an inch in length.

THAUMANTIAS TYPICA, *n. s.* (*mihi*). Plate XIV., Fig. 4, *a*.

The umbrella of this species is very conical, smooth, and exceedingly transparent. The sub-umbrella is much more depressed than the umbrella; a marginal vessel and veil surround its opening. The tentacles are twenty-four in number ($5 \times 4 + 4$), very elastic, springing from yellowish bulbs containing an otolitic vesicle, distinctly marked. These tentacles were pilose and granular. The stomach is short and broad, terminating in four fimbriated lips. Radiating vessels, four simple, interrupted by four ovaries, short, leaf-shaped, of a pale yellowish-green tint; when magnified, exhibiting a cellular structure. I obtained this Medusa on August 21, 1857. Its length was two-thirds of an inch.

THAUMANTIAS NEGLECTA, *n. s.* (*mihi*). Plate XV., Fig. 5, *a*.

Umbrella strictly hemispherical, transparent, colourless, and smooth, of rather large size, measuring from a half to one and a half inches in diameter; sub-umbrella corresponding in shape with umbrella, but rather more depressed, occupying not quite two-thirds of its length. A marginal vessel and veil surround the opening of the umbrella, which is bordered by thirty-two ($7 \times 4 + 4$) very contractile tentaculæ. These spring from as many colourless though distinct ocelli. The sub-umbrella is traversed by four radiating vessels. The ovaries are four in number, of a faint blue tinge, and an elongated ovate form. They were very conspicuous when the animal was in motion. Peduncle of a pale-yellow colour, wide at its base, then narrowing, and terminating rather suddenly in four long, slightly fimbriated lips.

This Thaumantias resembled *T. hemispherica*, differing in the colour of most of its organs, which in that species is pretty constant; also in the shape of its peduncle and general appearance. The present Medusa is gregarious. I have met with it in considerable numbers on more than one occasion in the same locality (Kingstown Harbour). It is rather a delicate animal.

BOUGAINVILLEA DINEMA *n. s.* (*mihi*). Plate XV., Fig. 6, *a*.

The umbrella of this species is globose, but rather elongated, contracted at its opening. In shape it bears some resemblance to the *Bougainvillea nigritella*. Its margin is bordered by four groups of tentacle bulbs, somewhat similar to those in *B. Britannica*, but the tentacles, in-

stead of being as many as the bulbs, as in that species, were only two to each group, one being placed at each extremity of the latter. These tentacles were not apparently possessed of much contractile power, differing in this respect from *B. Britannica*, the tentacles of which are exceedingly elastic. They were generally carried (in the present species) in a stiff, extended position. The sub-umbrella is about two-thirds the length of the body, and is slightly truncated at its summit. Peduncle, four-lobed, yellow; viewed from above, it presents an appearance as of four leaves placed with their bases opposite to one another. The lip characteristic of the genus is in this species very complicated, dividing and subdividing a number of times. The animal is rather larger than *B. Britannica*, but is much less lively and interesting in its motions.

At the time of capturing this species, I also procured several individuals of *B. Britannica*. The difference between the two animals, which were confined in the same vessel, was thus very readily observable.

DIPLONEMA, *nov. gen.* (*mihi*).

Umbrella globose, radiating vessels four simple, four conspicuous ocelli opposite the four simple vessels. From one of the ocelli spring two long tentacles; peduncle cylindrical, slightly contracted near its orifice, and terminating in four indistinctly lanceolate lips.

D. Islandica, *n. s.* Plate XV., Fig. 7, *a*.

The umbrella of this Acaleph is slightly inflated, globose, intermediate in form between that of Euphysa and Modeeria. Its length is one-fourth of an inch; the opening is surrounded by a marginal vessel and veil. The ocelli are four in number, very conspicuous, of a brilliant crimson colour. Three of these are destitute even of rudimentary tentacles. From the fourth, however, two long translucent tentacles originate. These are nearly colourless, slightly widening near their bases, and curled as in Modeeria, when the animal is in motion. The sub-umbrella occupies about two-thirds of the length of the umbrella. From its centre depends a cylindrical peduncle of a pale-yellowish fawn colour, slightly contracted near the opening of the stomach, which is bordered by four not very well-marked lanceolate lips. There is nothing remarkable in the appearance of the four simple vessels. From the base of each of the two long tentacles there sprouted a wart-like body, strongly resembling those observed by Professor E. Forbes in the *Sarsia prolifera*. On one of the tentacles themselves, at some distance from its junction with the body, a third gemmule was observable. This was in a more advanced condition, the ocelli being perceptible. As reproduction by gemmation has been previously observed to take place from the peduncle and tentacular bulbs, and in the present instance from the tentacles themselves, the statement of Professor E. Forbes is fully verified, that gemmation may occur anywhere in the course of the granular tissues. The habits of this animal were lively and active, while its jerking movements, when confined in a vessel of sea-water, rendered it an interesting and

attractive object. Its true position is evidently between the genera Modeeria and Euphysa, since it possesses characters common to each, though at the same time its own peculiarities are sufficiently well marked to entitle it to rank as a distinct genus. But, though now first described as a British Acaleph, it is doubtful whether it has not already been observed elsewhere. Steenstrup, when treating of the development of the claviform polypes, in the second chapter of his essay on the "Alternation of Generation," describes a species of coryne, which he met with in Iceland, in the year 1840, from the base of the head of which certain bell-shaped bodies depended. From this circumstance he denominated the zoophyte "*Coryne fritillaria*." These bell-shaped bodies were furnished with ocelli, and after undergoing certain changes became detached from the body of the parent animal, and swam about in the water as free Medusa-like creatures. On a subsequent occasion, and in the same locality, he met with a free Medusa closely resembling the detached campanulate bodies just mentioned, differing from these last only in size, and by the presence of a lobate organ attached to the base of the tentacles. On comparing the representation of my Medusa with the figure and description of Steenstrup, the resemblance between the two will be found sufficiently striking. I think it probable that this Acaleph, though not, perhaps, identical with that described by the Danish Professor, is so closely allied that we may consider it the Medusoid of some species of Coryne. It is distinct from the Medusoid of the *Syncoryne sarsii* described in 1843 by Dujardin, under the name of Cladonema, which agreed with the Medusoids obtained lately at Bamborough by Mr. Alder, and "referred by him to the *Coryne Listeri*." We cannot, in all cases, be acquainted with the zoophyte to which certain Medusoids should be referred; this should not hinder us from describing and recording any of the latter animals with which we come in contact (see Forbes, page 72). It is much to be regretted that the development of our native Tubulariadæ has as yet been insufficiently studied.

Steenstrupia Owenii, *n. s.* (*mihi*). Plate XV., Fig. 8, *a*.

This Medusa is $\frac{1}{15}$th of an inch in length; umbrella nearly globular, slightly contracted near its orifice; the sub-umbrella occupies rather more than two-thirds the length of the umbrella, with which it is connected by a cord. Round the margin are four elongated ocelli or tentacular bulbs, of a pale-yellow fawn colour, very similar to those in *S. flaveola;* only one of those is furnished with a tentacle. The latter is five and a half times the length of the umbrella, of a moniliform and granular structure. Round the base of this tentacle three tubercular bodies had their origin, evidently the granules of future Medusæ; two of these were in a low state of advancement; the third presented distinct traces of an interior cavity. The radiating canals were four in number, very conspicuous and broad. From the centre of the sub-umbrella depended a short, broad peduncle, of the same colour as the vessels and tentacular bulbs. Within the peduncle at its base was a cluster of cells forming the ovary. Except in the form of its umbrella the present differs little from the pre-

viously described species of Steenstrupia: there can, therefore, be no doubt that it is rightly referrible to that genus. I have taken the liberty of naming this species after the distinguished author of "Parthenogenesis."

Concerning the development of these animals, our knowledge is still insufficient. The production of Medusoids from hydraform zoophytes has been ably investigated by Dr. T. Strethill Wright (*vide* his papers in the "Edinb. New Phil. Journal"). To Mr. Peach we are indebted for an interesting account of the curious metamorphosis of a zoophyte-like animal, which he obtained in March, 1855, on an old valve of *Psammobia ferroensis*. These creatures were of a hydra-like form, attached to the shell by a short footstalk. The upper part was rather inflated, and furnished with a slightly raised and rounded centre, from which extended four long and four short leaf-like arms, each granulated down the centre. The description of these anomalous animals can hardly be reconciled with that of any known species of zoophyte.

After a few days the form of the animals began to change, and they subsequently became transformed into true naked-eyed Medusæ: for a full account of these changes, see Mr. Peach's paper and figures published in the "Ann. Nat. Hist." for 1856. The Medusoids showed some resemblance to Lizzia and Sarsia. The production of fixed polypes from the ova of Turris has been observed by Gegenbaur ("Compt. Rendus," Sept. 1853). Mr. Hincks ("Ann. N. H.," 1852) has described the Medusoids of *Campanularia volubilis*.

During the past summer I have repeatedly submitted living specimens of Laomedeæ to examination. The Medusoids of *L. geniculata* are generated in the same manner as those of *L. gelatinosa*, observed by Van Beneden, namely, in the interior of the so-called ovarian capsules. The Medusoids so produced speedily detached themselves, and moved rapidly through the water. This is at variance with the account given of the development of *L. geniculata* by Loven, who affirmed ("Wieg., Archiv," 1857) that the Medusæ-like bodies in this species never become detached, but merely expanded at the summit of the ovigerous capsules discharged ever in the form of ciliated gemmules, which subsequently attached themselves, and developed into hydraform Zoophytes. The researches of Loven are detailed with considerable accuracy, so that there arises a difficulty as to the manner in which we are to explain the occurrence of the reproductive zooids, under a twofold aspect, in the same species. Perhaps it is due to difference of sex. The Medusoids of *L. dichotoma*, as observed by Mr. Peach and the late Sir J. S. Dalyell, were free and detached; and the figure of Mr. Peach (in Johnston's "Brit. Zoophytes," vol. i. p. 119) exactly coincides with the Medusoids of Laomedea above noticed. It will be remembered that Sir J. S. Dalyell bestowed on these animals the extraordinary name of *Animalculum tintinnabulum*. In describing the development of any of the Campanulariadæ, writers should carefully note the specific characters of the Zoophyte observed, as the British species of this group are not yet sufficiently known. Much yet remains to be done before our knowledge of

this interesting subject can be considered as even approaching completion; of the reproduction of several forms we may be said to know nothing. Were it not for this comparatively backward state of our knowledge, I would not have ventured to bring forward these meagre and incomplete researches. On a future occasion I trust to have the pleasure of laying before you a more full and ample account of the present state of our knowledge of these strange and beautiful organisms.

NOTE ON A CURIOUS MONSTROSITY OF THE COMMON SHELL (FUSUS ANTIQUUS).*

BY G. C. HYNDMAN, BELFAST.

PLATE VIII.

The specimen exhibited was obtained by dredging off Groomsport, in the county of Down, by Mr. Samuel Vance, along with Mr. Murray. Unfortunately, the animal was not preserved, as the shell was boiled along with a number of others before its singular form attracted notice. I have no hesitation, however, in referring to it as a curious and interesting monstrosity of the *Fusus antiquus*, although its convolute form more nearly resembles that of the foreign genus, Delphinula. The colour and structure of the shell, together with the projection of two or three turns of the original apex from the centre of the coil, confirm my view, and, no doubt, the abnormal form has been occasioned by some accident befalling the animal whilst in the young state, which obliged it to change the usual angle of the body whorl with the central spire, and thus the shell has become convolute, as we see.

ON THE EMRYYO STATE OF PALINURUS VULGARIS.* BY R. Q. COUCH, M.R.C.S. ENG., ETC. ETC., NORTH PENZANCE.

PLATE XVII.

At the time of the publication of Professor Bell's admirable work on British Crustacea, by some inadvertency the particulars respecting the embryo condition of *Palinurus vulgaris* were overlooked, and up to the present time have not been published. As several years have now passed, and the subject has not hitherto attracted the attention of any other observer, I would wish to publish the following observations:—

The metamorphoses of the Decapod Crustacea may now be considered as established by observations made in every part of the world. The first announcement of the discovery came from *Ireland*, from experiments made near Cork by the late J. V. Thompson.

The form under which the young Decapods first appeared was announced as belonging to the genus Zoea, and all subsequently published

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* Read before Section D at the Meeting of the British Asssociation, Dublin, August 26, 1857.

observations have confirmed this. But in the species to which I now refer there is an important exception. Lest there should be any error on the matter, I have during the past summer (1857) again investigated the point, and have bred many thousands in confinement, and under the microscope have seen them escaping. So that there can in my own mind be but little doubt on the matter.

The young of *Palinurus vulgaris* differ from every other species with which I am acquainted. On escaping *ex ovo*, the different parts are very obscure, being very closely folded together; but in a few minutes they spread out sufficiently to become recognisable under a very moderate magnifying power. The carapace is globular, oval, slightly pointed or produced both at the anterior and posterior margin, and also slightly contracted anteriorly, so as to give the appearance of a rostrum. The abdomen is moderately long, and from four of the six annulations of which it is composed arise eight pairs of tendril-like appendages. The lateral margin of each ring is expanded into a thin, projecting process, from which the articulated appendages arise. These tendrils are long, slender, and dichotomous. Their double character commences at the third joint; for the remainder of their length they are nearly equal, and are covered with strongly marked spines; their termination is pointed. The caudal extremity is simple, contracted, pointed, and somewhat oval; on the centre of the rostrum is a dark spot; the eyes are placed on enormously long and stoutly club-shaped peduncles, which are attached by very narrow and slender points. The pedunculated eyes are about two-thirds as long as the carapace.

This concise description, with the figures accompanying it, will sufficiently explain the great differences between this and the young of all other species hitherto described.

So general is the Zoe form, that it has even passed into an expression with investigators of this branch of Natural History; and "the Zoe condition" has been considered equivalent to "the embryo state" in speaking of these creatures.

The contrast between that of the present species and others is very great. In them, the eyes are sessile; in this, enormously pedunculated. In them the limbs are beneath the carapace; in this they are attached to what, for clearness, I have called the abdominal rings.

Instead, therefore, of belonging to the genus Zoe, this would be placed in Phyllosoim of Milne-Edwards, as belonging to the Stomapodes.

ON A SECTION ACROSS SLIEVENAMUCK, COUNTY OF TIPPERARY.*

BY JOHN O'KELLY, ESQ.

THE Slievenamuck range is separated from the Galtees by the vale of Aherlow. It commences about ten miles south-west of the town of Tip-

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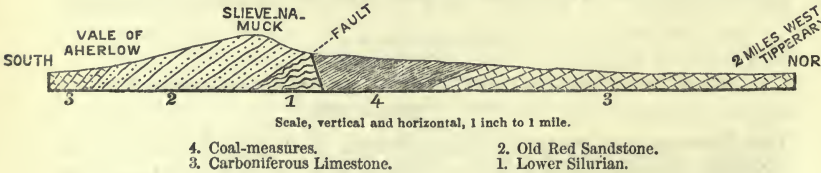
* Read before Section C at the Meeting of the British Association, Dublin, August 26, 1857.

perary, and ends at Bansha, four miles south-east of Tipperary. It varies in height, but averages 1000 feet, seldom exceeding 1200 feet above the sea.

Commencing at the south end of the section, limestone is seen in the vale of Aherlow, to which succeed the Yellow Sandstone and Old Red, which have been described by my colleague, Mr. Wynne, and with a description of which I shall not detain you. On following up the section, the dip is steady to the south, the angle becoming less towards the top of the hill, and for some distance down on the northern slope, till you come to the conglomerates at the base of the Old Red, which crop out, forming escarpments in many places along the north side of the range. Under the basal bed of the Old Red, gray and red Silurian rocks occur for about 200 feet. It is very much cleaved, and the bedding is uncertain. Abutting against the Silurian, and a little farther north, as if dipping under it, the black shales of the coal-measures occur, brought down by a great fault. This fault is extremely well marked, and can be traced running nearly in a straight line E. by N. The fault produces a marked feature along the north side of Slievenamuck range, which contrasts very strongly with the gentle slope of the south side.

I have estimated the throw of this fault, "supposing the Old Red to have been the same thickness on the north as on the south side." At 5000 feet of a downthrow, the coal-measures only occur on the west end of Slievenamuck, and appear to be cut off by a cross-fault. A short distance east of this section they dip steadily south, the angle increasing as you approach the fault. Thin beds of culm are to be found in the black shales, and there is a long range of quarries of flagstones, similar to the flagstones of Carlow and Kilkee. In the county of Clare these flagstones are marked by annelid tracks, and there are vegetable impressions in the shales.

From underneath the coal-measures the limestone rises to the surface of the fertile place extending from Tipperary to Charleville, in the county of Cork. The limestone is covered with a large deposit of drift, and is only seen in an occasional quarry. It is generally compact, of a bluish-gray colour, containing corals and other fossils. It is often very difficult to discern the bedding; but whenever the stratification is seen, it dips to the south at angles from 10° to 20°.



Scale, vertical and horizontal, 1 inch to 1 mile.

4. Coal-measures.
3. Carboniferous Limestone.
2. Old Red Sandstone.
1. Lower Silurian.

ON THE SPECIFIC DISTINCTION OF THE BRIDLED GUILLEMOT (URIA LACHRYMANS, TEMMINCK). BY THE REV. F. O. MORRIS, A. M., ETC.*

In the study of the science of Natural History, the very first lesson the student has to learn is to attempt to establish no conclusion upon a mere opinion, his own, or that of any other person, but to let facts themselves alone guide him to the result. This is plainly the case with regard to questions of specific identity, and naturalists must reverse the analogous motto "Ubi Scriptura silet, ibi Ecclesia loquitur," and speak alone with confidence where Nature herself speaks with the eternal and unerring truth of the God of Nature. This remark applies to the subject on which I propose to offer some observations to you to-day—a question in itself of some interest to those who are studious in such matters, and especially so when viewed in reference to one or two other kindred cases, with which it has not, so far I am aware, been hitherto compared. (Since making the above remark, I must here observe that M. Temminck has pointed out, in a passage I shall have occasion to refer to by-and-by, one of the parallel cases to which I refer, but in ambiguous words, which may intend a contrary conclusion.)

There are four species of the present restricted genus, Uria. I say four, not as defining the number myself, but as stating the generally received opinion, with which, however, as I shall presently have to state, I myself coincide, though some, with what has appeared to them sufficient reason, have thought differently. As to two of these species there is no manner of doubt on any side; on these, therefore, I shall offer no remarks. Neither is there any doubt that there is another, a third, British species; the question is, whether there are two other ones —whether three, or four, in all, or not.

Now, excepting in one main particular, the two species, *Uria troile*, and *Uria lachrymans*, have been described to be exactly alike, or as nearly so as possible. There are, however, some minor differences which, equally occurring in many other species, may, in such cases, be real specific distinctions, and that, although allied species may possibly at times exhibit the like, as variations from the usual type,—perhaps even exhibit them in these exceptional instances more decisively marked. I allude, with reference to the species before us, to the particulars of size and colour, the common species, *Uria troile*, being by some said to be, if anything, rather larger and rather darker, while by others the *Uria lachrymans* is so described, and the bill rather stouter. This last, though perhaps not a common variation, is certainly a mere variation, as in the instance of the Crossbill, and perhaps in the Nutcracker. And so also with regard to size; the fact is, there are found larger and smaller, and heavier and lighter birds in each case. In addition, however, to these, there is another, which may be called an "ocular demonstration"

* Read before Section D at the Meeting of the British Association, Dublin, August 26, 1857.

of the specific difference between the two species. The eye in this Guillemot (*Uria lachrymans*) has been noticed by John Gatcombe, Esq., of Wyndham-place, Plymouth, a very exact and accurate ornithologist, as mentioned in a letter to me, as being considerably larger than that in the other. It is encircled by a narrow white band or rim, from which the white line extends backwards and downwards for about an inch and a half. This line, from which the bird derives its name, in the Latin, French, and English languages, is the chief apparent mark of difference, the main feature on which its specific distinction has been contended for. It has never, I believe, been imagined to be a characteristic of either sex of the common species, but, on the contrary, is seen in the male as well as the female, in both old and young birds, and that in spring, summer, autumn, and winter.

The question then is, is this a real specific distinction, or is it merely an occasional though perpetually recurring variety,—a variety whose range would appear to be defined, the chief station of the bird bearing it being Spitzbergen; while, as regards the British coasts, individuals have occurred in every, or almost every, place where the *Uria troile* is commonly seen.

Now, with regard to colour, it will, I believe, be found that, as already briefly mentioned, this species is specifically darker, that is, in old and mature specimens, than *Uria troile*. Old birds of the latter species would seem to become lighter than the young ones; while with the present species, so to call it, the case is reversed, old birds becoming almost black.

Again, the white circle round the eye, and the line of extension from it, has nothing to do with age, for, as remarked in a letter to me from Mr. Gatcombe, the white line is quite distinct in a young bird of the year, in its first winter plumage. Now, in the first place, I do not think that in the case of birds, varieties occur in perpetuity with such exactitude as in the present case, or as they certainly do in insects. *Primâ facie*, if the mark at the *back* of the head may be spoken of, it is naturally to be judged that the two birds, the one with it, the other without it, are distinct. In some species every possible variation of colour and marking exists, as for instance in the Buzzard and the Crossbill, the Ruff and others. Great, too, are the differences in very many species in the summer and the winter plumage; manifold also the shades of pied varieties, from the perfect albino down to the unfortunate bird, sure to be shot, that shows a single "white feather." But I repeat, such variations are of a totally different character from that of the case before us. Here we have a permanent, distinctive, and always uniform mark of difference—"Quod semper, quod ubique, quod in omnibus,"—"semper idem." And, to come to the point to which I have already briefly adverted, we have instances of a precisely similar kind in other species where no possible doubt is or can be, at least none is, entertained. One of these, that to which I have already more particularly alluded, as having occurred to me, is that of the Crow (*Corvus corone*), and the Hooded Crow (*Corvus cornix*), which two birds are so exactly or so

closely alike in all but the colour of parts of the plumage, that it would be impossible, or next to impossible, to distinguish them by any other than that external mark. True, indeed, their habits are different, the crow (*C. corone*) being a solitary bird, only few being at times collected together to feed on a common carrion, while the Hooded Crow (*C. cornix*) is decidedly gregarious; but not only in an inquiry into specific distinctions do we look first to external or internal marks, and postpone the consideration of the habits, but even these last, if mainly considered (even though there should be a close resemblance), might very likely lead us astray, as in the case of the Black-backed Gull (*Larus marinus*), where we find the young bird, the Wagel, collecting together in numbers, but the old birds keeping aloof, singly, or at most generally, in pairs, seldom more than a pair being seen together. And it is not merely that it is the young birds that thus keep together as the members of a family, for we see many more than these in a flock, the eggs being only three in number, and that without the presence of the parents, as is the case in other continuances of the family union, and, moreover, I believe, until the full assumption of the adult plumage, probably the third year.

In a paper, entitled, "Remarks upon the Ringed Guillemot," read before the Natural History Society of Glasgow by Robert Gray, Esq., and forwarded to me by that gentleman for insertion in "The Naturalist," he quotes from a statement made by J. Wolley, Esq., to the British Association in the year 1850, that in the Ferroe Islands the two species *troile* and *lachrymans* breed together promiscuously, in the proportion of 1 to 10; on which a writer, E. K. B., in a subsequent letter to me as the editor, observes, that it is left doubtful whether it is meant that the two species breed together actually, or merely in the same situations, a decision of which question would appear to decide the fact, *pro* or *con* the specific identity or difference of the two species at once—"pares cum paribus." It is, however, not said which is meant. But, on the other hand, Mr. Proctor, Sub-Curator of the Durham University Museum, found, during a visit at Grimsey, an island north of Iceland, all three species, *Brunnichii*, *troile*, and *lachrymans*, on separate rocks, the eggs being distinguished by the natives, and each of the birds known by them under different names. This latter statement, I may here observe, is corroborated by Mr. Arthur Strickland, who asserts that at Flamborough a few of the *Uria lachrymans* breed, but in places more difficult of access than *Uria troile*, and that the egg is invariably white. Mr. Wolley, on the contrary, has stated that the eggs of the two species, the present and the common one, are not distinguishable.

The late Mr. Macgillivray, in his "Manual of British Birds," speaks of the ring as occurring on *Uria lachrymans* only in summer, and then only in some individuals; but in his subsequent work, the "History of British Birds," he seems anxious to make a species of it. He, however, asserts that the angle of the lower mandible is farther from the base than in the common species, and more prominent; whereas it has been otherwise described (by Sir William Jardine) as near to the base, and very

slightly developed. Mr. Macgillivray also points out what he considers a difference in the feet, but this is a mere difference in different individuals of different sizes.

On the whole, then, the conclusion, I think, to be arrived at is, that neither in the size, shape of bill, nor of feet, is there any other but an accidental, or rather temporary, difference between a specimen of the one species and a specimen of the other, these differences existing *invicem* first in one and then in the other, but that the larger eye, and the distinct line from the eye, joined to the wider and distinct rim round the eye, are actual and permanent differences, and mark the species as distinct.

DIATOMACEÆ OCCURRING IN CHALK.* BY THE REV. EUGENE O'MEARA, A.M., MEMBER OF THE DUBLIN UNIVERSITY ZOOLOGICAL AND BOTANICAL ASSOCIATION.

On the occasion of a recent journey along the coast of the county of Antrim I visited an extensive quarry of white limestone, or chalk, at a place called Ballyleg, on the road between Carrickfergus and Larne. As I gazed upon the numerous strata, piled one upon the other to the height of more than 100 feet, I thought how many myriads of diatomaceous forms may have lain buried in these rocky sepulchres for thousands of years, and felt a determination to try if I could disinter them. Accordingly, I procured a specimen of the chalk from a depth of about 120 feet below the summit of the cliff. A second specimen I took from the cliffs at Glenarm; a third from Garron Point; and a fourth from the white cliffs between the Giant's Causeway and the village of Portrush.

Having in the first instance washed the specimens well for the purpose of removing such forms as might have been attached to the surface, I dissolved them separately in hydrochloric acid, the vessels used in the process having been carefully rinsed.

The chalk from the Ballyleg Quarry, having been so dissolved, was boiled over a spirit-lamp, in dilute sulphuric acid, for about half-an-hour, and the acid having been removed by repeated washings with water taken directly from the pipe, and allowed to settle for some time before it was used, a small portion of the sediment was mounted in the usual way with Canada balsam.

The other specimens having been dissolved in hydrochloric acid, and washed in distilled water, were mounted in balsam, without any further preparation.

Having described the process, I come now to speak of the result.

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* Read before Section D at the Meeting of the British Association, Dublin, August 26, 1857.

In all the preparations diatomaceous forms were found. Some few were unknown to me, and all the rest were discovered to be identical with existing forms, described by Mr. Smith in his work on the Diatomaceæ.

The following is a Table of the species which I found on the slides. I have marked in parentheses whether the species is found in the recent state, in marine, fresh, or brackish water, and this on the authority of Professor Smith's "History of British Diatomaceæ."

Achnanthidium lanceolatum (fresh water); Glenarm and Portrush.
,, *lineare* (fresh water); Garron Tower and Portrush.
,, *microcephalum* (fresh water); Ballyleg Quarry, Glenarm, and Portrush.
Achnanthes brevipes (fragment), (marine); Glenarm.
Actinocyclus sedenarius (marine); Portrush.
Amphora minutissima (fresh water); Ballyleg Quarry, Glenarm, and Portrush.
,, *ovalis* (fresh water); Ballyleg Quarry.
Biddulpha —— (?) (fragment), (marine); Ballyleg Quarry.
Cocconeis pediculus (fresh water); Ballyleg Quarry, Glenarm, and Portrush.
,, *scutellum* (marine); Glenarm.
Cocconema parvum (fresh water); Ballyleg Quarry, Glenarm, and Garron Tower.
Coscinodiscus radiatus (fragment), (marine); Portrush.
Cyclotella Kutzingiana (fresh water); Ballyleg Quarry and Glenarm.
Diatoma vulgare (fresh water); Ballyleg Quarry and Glenarm.
,, *elongatum* (fresh water); Glenarm and Garron Tower.
Denticula tenuis (fresh water); Glenarm, Garron Tower, and Portrush.
Epithemia sorex (fresh or brackish water); Glenarm.
,, *gibba* (fresh water); Glenarm.
,, *granulata* (fresh water); Glenarm.
Gomphonema constrictum (fresh water); Ballyleg Quarry and Glenarm.
,, *dichotomum* (fresh water); Ballyleg Quarry and Glenarm.
,, ,, β (fresh water); Ballyleg Quarry and Glenarm.
,, *acuminatum* (fresh water); Ballyleg Quarry.
Grammatophora marina (marine); Ballyleg Quarry.
Himantidium pectinale (fresh water); Ballyleg Quarry and Glenarm.
Melosira varians (fresh water); Ballyleg Quarry, Glenarm, and Garron Tower.
,, *nummuloides* (marine); Ballyleg Quarry.
Meridion constrictum (fresh water); Ballyleg Quarry.
Navicula crassinervia (fresh water); Ballyleg Quarry and Portrush.
,, *didyma* (marine); Glenarm.
Nitzschia minutissima (fresh water); Garron Tower.
,, *sigma* (fragment) (marine or brackish water); Portrush.
,, *tenuis* (fresh water); Ballyleg Quarry and Portrush.
Odontidium mutabile (fresh water); Glenarm and Garron Tower.

Pinnularia radiosa (fragment), (fresh water); Ballyleg Quarry.
Surirella minuta (fresh water); Ballyleg Quarry and Glenarm.
,, *subsalsa* (fresh or brackish water); Ballyleg Quarry.
Synedra capitata (fresh water); Glenarm.
,, *radians* (fresh water); Ballyleg Quarry and Portrush.
Tabellaria flocculosa, (fresh water); Ballyleg Quarry.
,, *fenestrata* (fresh water); Ballyleg Quarry.
Tryblionella marginata (fresh and brackish water); Ballyleg Quarry.

In all, 42 different species, which may be distributed in the three following classes:—

Species found in fresh or brackish water, . . .	4
Marine species, ...	7
Fresh-water species, ...	31
Total, . . .	42

From this summary it appears that, as regards the number of species found in these four specimens of chalk, there was a great preponderance of fresh-water forms; and the same observation applies to the number of specimens belonging to each species.

These facts I thought might possibly possess some interest, and, therefore, I have not hesitated to submit them to the consideration of the Section. I purpose following up this subject, and will publish any further results in the "Transactions of the Dublin University Zoological and Botanical Association."

ANALYSIS OF CERTAIN ALLIED GENERA OF TERRESTRIAL ISOPODA; WITH DESCRIPTION OF A NEW GENUS, AND A DETAILED LIST OF THE BRITISH SPECIES OF LIGIA, PHILOUGRIA, PHILOSCIA, PORCELLIO, ONISCUS, AND ARMADILLIUM. BY PROFESSOR JOHN ROBERT KINAHAN, DEPARTMENT OF SCIENCE AND ART, M.B.T.C.D., M.R.I.A., HON. SEC. DUBLIN NATURAL HISTORY SOCIETY, ETC. ETC.*

Having been during the past summer engaged in researches among the Irish Isopoda, I am induced to lay before your Association the results to which I have been led by an examination of the above genera,—the rather, as from authors this interesting family has received but little attention, and in consequence but little is known with certainty concerning the habits, species, and distribution of the group. This is the more remarkable, as of the fourteen species now to be noticed, all, with the exception of two, are of extremely common occurrence, and their study, owing to their size, comparatively easy. In proof of this state-

* Read before Section D at the Meeting of the British Association, Dublin, August 26, 1857.

ment I may mention that all except two (one a marine species) have occurred to me in a garden not sixty yards square, and nearly all in abundance.

It would appear to have been the fashion with carcinologists (probably on account of the terrestrial habits of most of the genera), to nearly ignore their existence, and hence the mistakes with which the authorities abound. This renders a brief sketch of the bibliography of the group necessary.

Historical Bibliography.

Although a host of writers have from the earliest days of science noticed these animals, yet the true nature of their generic, specific, and familiar relations have been so totally misunderstood, and the characters drawn on for diagnosis are of so little real value, that we may pass over the labours of the majority of authors, and come at once to the works published within the last twenty years, the rather as this part of the subject has been so ably treated of by Professor A. Lereboullet in the "Transactions of the Strasbourg Society," just now to be referred to.

Passing, therefore, over the writings of Linnæus, Geoffroy, Fabricius, De Geer, Cuvier, Leach, Dumeril, Latreille, Risso, Savigny, and a host of others, whose characters, drawn from colour chiefly, render their descriptions worse than useless, we will come to Brandt, who appears to have caught at the true distinctive characters of form, and may be said to have laid the first foundation of a perfectly natural system, in his "Conspectus Monographiæ Crustaceorum Oniscodorum," published in Moscow in 1833; and although in some instances he has stopped short in his analysis, and has even mistaken the true import of some of the characters, yet it must be a matter of regret that this naturalist has not yet fulfilled his promise by giving to the world a full history of the group.

Milne-Edwards, who comes next in order of time, has scarcely in this sustained his well-deserved reputation in other groups, as this part of his work is replete with errors of a serious nature, and the descriptions, many of them copied verbatim from the earlier writers, and mere accounts of colours, are useless. Witness the description of *Philoscia muscorum*, a genus which he can scarcely have examined, or he would not have proposed that it should be reunited to Oniscus, a genus from which, as we shall see, it differs widely.

In the fourth volume of the "Memoirs of the Natural History Society of Strasbourg," published in 1853, appears a paper from the pen of Professor A. Lereboullet, M. D., Director of the Museum at Strasbourg, entitled, "Sur les Crustaces de la Famille des Cloportides qui habitent les Environs de Strasbourg," of which it is impossible to speak in too high terms, whether we regard the minuteness of details, or the author's patient investigations into the labours of others, and although in one or two points he has evidently fallen into error, yet, as a whole, this little work must be long looked on as a standard on the subject.

I must here also notice an excellent, but scarce little work, which

has but recently come into my hands, and for the perusal of which I have to thank the kindness of A. H. Haliday, Esq., entitled, "Prodromus Synopseos Crustaceorum Prussicorum," published at Königsburg, 1834, from the pen of E. G. Zaddach, Ph. D., which contains much useful matter; among other things, M. Edward's error concerning Philoscia is noticed.

Dana in his splendid work on the Crustacea, has proposed in some respects a new arrangement of the group, but has, as I think, mistaken in some cases the bearings of the characters, as will be shown further on.

Valuable notices of separate genera and species have appeared as detached papers in some of the journals, chiefly German (as, for instance, the description of the curious genus, *Titanethes albus* of Schiödte (*Phærusa alba, Koch*), in Schiödte's interesting account of the subterranean Fauna of Carniola), which have thrown much light on the true affinities of these animals, and render a revision of our classification necessary.

It will be necessary to glance at the systems of classifications adopted by the several authors mentioned; but first I must notice a most elaborate, as far as illustrations go at least, work by Henrich Schæffer, intended as a supplement to Koch's "Fauna Germanica." In this work we have spurious species multiplied to a most inconvenient extent, and his genera are most of them too large: thus, under Ligia he includes *Philoscia muscorum* (figured as *Ligia melanocephala*, a more natural alliance, by the way, than M. Edwards, of Oniscus). Itea includes Itea proper and Platyarthus (*Br.*), and probably a third form. He has changed Brandt's name, Ligidium, for Zia, and his Armadillo into Pentheus, whilst Armadillium (*Br.*) figures here as Armadillo, Latr. The other genera described by him are Phærusa, Oniscus, and Porcellio, the two latter including as species many which can scarcely be looked on as even varieties.

On Classification.

Brandt, taking as familiar characters the number of joints in the terminal appendages of the antennæ and the number of pairs of caudal appendages (i. e. the last pair of false feet), has divided the genera known to him into two sections, viz., Ligiea (Ligia and Ligidium) and Oniscinea, subdivided according to the length, form, and insertion of the exterior caudal appendages, into (1) Porcellionea (Trichoniscus, Platyarthus, Porcellio, Philoscia); and (2) Armadillinea (Armadillidium, Cubaris, Armadillo, and Diploexochus).

Although these generic groups are natural enough, he appears to have mistaken the true nature of the caudal appendages, which in all the genera belonging to this group consists truly of two pairs, as we hope to show when we come to treat more in detail of them, although in all the groups except Ligiea their true nature is somewhat obscured by the truncation of the margin of the peduncle. In Ligidium, included by him among the Ligiea, but which, as will be seen, we propose to place in a separate division, the appendages are really two pairs.

His lesser divisions and species are many of them faulty, being

governed nearly entirely by considerations of number and colour, characters of a very minor importance in classification, though oftentimes convenient when conjoined with the more permanent characters, of form, position, and structure. Some of his genera probably must fall, at least in their present shape, their descriptions being so imperfect as to render them unrecognisable, owing to his imperfect means of observation: thus, Trichoniscus may possibly turn out to be Itea, Zia, or some of their allied genera, more fully described by later writers.

Milne-Edwards has for the most part copied Brandt, but has proposed new primary divisions, in the naming of which he has been singularly infelicitous. He has drawn his familiar characters from the comparative length or brevity of the last false feet, as compared with the terminal segment of the abdomen, and thus makes two primary groups, *Cloportides maritimes* (Ligia and Ligidium): and *Cloportides terrestres*, subdivided, according to the form and length of the last pairs of false feet and their appendages, into Porcellioniens (Oniscus, Philoscia, Deto, Porcellio, Trichoniscus, Platyarthus), Armadilliens (Armadillidium, Armadillo (includes Cubaris), Diploexochus), and Tylosiens (Tylus).

The names of his primary divisions show us the danger of naming groups from habits. Ligidium, although included among the Maritime woodlice, is as truly a terrestrial species, and found at as great a distance from sea, as Porcellio itself. Most of his descriptions of genera are avowedly mere transcripts from previous authors, even those which one would suppose ought to have come under his own notice, being indigenous, as in the case of Philoscia, which he allies to Oniscus, whereas in truth it is much more closely allied to Ligia in all its characters. His specific descriptions are almost all mere details of colour, without one truly distinctive character.

Dana has much extended the group, uniting, however, to the genera already mentioned others, whose claim to the alliance appears but slight, viz., the Limnoriæ and Asellidæ, on account of the characters of the posterior pair of abdominal appendages. He has thus made one large group, Oniscoidea, and in his definitions has largely entered into characters which may be generic.

He divides the Oniscoidea into three groups, according to the mode of articulation of the body; the number of articulations of the abdomen; the size of the last abdominal segment; the length of the caudal appendages (i. e. the last false feet); the absence or presence of a palp to the mandibles; and the number of articulations and size of the internal antennæ. (Of these, the characters of the number of articulations in the abdomen and internal antennæ, the size of last abdominal segment, presence of a palp to the mandibles, have reference solely to his last family (Asellidæ), a group which had been probably better omitted.) 1. Armadillidæ, according to arrangement of caudal appendages, divided into Tylinæ (Tylus), and Armadillinæ (Armadillo, Sphærillo, Armadillidium, Diploexochus). 2. Oniscidæ, according to number and form of articulations of maxilliped, form of articulation of fifth joint of external an-

tennæ, and form of peduncle and styles of caudal appendages, divided into Oniscinæ, Oniscus (including as sub-genera Trichoniscus, Porcellio, Oniscus). Philoscia; Platyarthus; Deto. Scyphacinæ (Scyphax, Stylo-niscus). Liginæ (Ligia, Ligidium). 3. Asellidæ, including Limnorinæ (Limnoria). Asellinæ (Jæra, Jæridina, Asellus, Janira, Henopomus, Munna). As I believe these last do not really belong to this group, I omit their characters.

Although this classification contains some new characters, many genera are omitted, which naturally belong to the group, and many of the characters are too artificial to be taken into account. The innovation of considering Porcellio, Oniscus, and Trichoniscus as sub-genera is highly objectionable (indeed it will be well when the term sub-genus is banished altogether from our nomenclature), as these divisions do not depend, as he seems to assert, on the mere number of joints in the terminal filament of the antennæ, but, as I hope to prove, on a number of other characters sufficient to constitute them, as real genera as Ligia and Ligidum. Mere number plays too great a part in his system also to allow of natural groupings. His classification, however, is valuable as restoring to their proper place the Armadillidæ, which, on account of their resemblance to certain Myriapodæ, have been hitherto, as it seems, unjustly degraded to the bottom of the list of Cloportides.

From a revision of these various systems, it appears, that putting out of sight such arbitrary characters as mere colour and number, divisional characters of most importance are: the comparative development of the external antennæ or rather of its filament; the mode of insertion and development of the last pair of abdominal feet, and perhaps we may add the form of the maxilliped; this last, however, is a character so difficult of application that it were, perhaps, as well to leave it out. Two very important sets of characters have been omitted or overlooked, which must be taken into account in any classification which seeks to form natural groups; these are,—the characters drawn from the form of the head; and from the *epimerals*, as they are generally called. These characters, being permanent in their structure, presenting differences easily caught at, and running also in parallel arrangement throughout the groups, I would propose as the basis of the classification, which, till a better shall arise, I would suggest as that which appears most natural and most in accordance with homological affinities.

The characters, then, which must be considered in detail are:—

1st. The amount of development of the so-called "epimerals" or *coxæ* of the posterior cephalo-thoracic and abdominal appendages.

2nd. The form of the head as regards the absence or presence of what are called the frontal or median, and lateral lobes.

3rd. The relative structure and development of the antennæ, and especially of the terminal filament, or, as we will call it, "*the tige*" of the external or superior antennæ.

4th. The structure and position of the last pair of abdominal false feet, their relations to each other and the last abdominal ring.

Before entering on these, the following nomenclature of parts must be stated:—*Head:* all the parts anterior to and including the first ring, or, in other words, the homologue of the carapace of the Brachyura. The term *cephalo-thoracic* refers to the portion of the body included between this point and the posterior border of the eighth ring, counting the head the first: this homologizes, we believe, with the pereion of Spence Bate; while the remaining six rings are referred to as the *abdomen*, homologizing with the abdomen of the Brachyura, and the pleon and telson of Spence Bate. The appendages attached to the last abdominal ring are cited as the last pair of abdominal feet, for such is evidently their nature; the so-called epimerals stand as *coxæ*, and the filament of the antennæ as *tige*.

I.—*Amount of Development of the "Epimerals."*

The "epimerals" first claim our attention. For the determination of the true homological relations of these we are indebted to the researches of C. Spence Bate, F.L.S., among the Amphipoda, who, in the first Part of his Report on the British Edriophthalmia, published in the Report of the British Association for 1855, has proved most conclusively that these so-called epimerals are truly and homologically the first joint, or, as he calls them, the *coxæ* of the ambulatory and swimming organs; and although, in the case of the posterior pairs of appendages in the Isopods under consideration, their true nature, when present, is oftentimes obscured, yet, by a little care in the examination, it may be at once seen, though somewhat disguised.

Their presence in the cephalo-thoracic rings seems to be constant in all the genera I have examined, or of which detailed accounts are extant; though sometimes, as in Ligidium, the suture which divides them from the edge of the true epimerals is so faintly marked as not to be appreciable; hence I suspect that Lereboullet laboured under an error in supposing them absent in *Ligidium Persooni*, for an examination of his own figures of the articulation of the ambulatory legs shows that they must be present, from the position of the articulation of the first joint, which arises from beneath a ledge which evidently is the coxæ of the limb: it is hazardous to speak positively on this point without an examination of specimens, but in Armadillium, Ligia, Philoscia, Philougria, Porcellio, and Oniscus, I find them well marked, and they are figured or recorded in Itea, Titanethes, Tylus, and several other genera. In the abdominal segments there may be some question of their presence, but what are usually called the posterior angles of the rings a very little examination shows really to be these coxæ. This is remarkably well seen in Ligia, and, judging from Dana's figures in Tylus above all, where they appear to be regularly articulated to the rings in the eight, i. e. the first abdominal segment. Dana appears to have overlooked this character altogether; there is some great confusion in his figures: many of the species certainly are not belonging to the genera to which he has referred them,—I may instance *Oniscus nigrescens*, *O. maculatus*, and *O. pubescens*, which are most certainly not Oniscus, but most probably Philoscia judging from the figures of the false feet.

An additional evidence of the true nature of these posterior angles is afforded by the mode of articulation of the posterior false feet, which is, in some of the genera, by means of a regular ball and socket joint.

Regarding their development in the abdominal segment (i. e. the *pleon* and *telson* of Spence Bate), we find the following types:—

1. Coxæ present in both cephalo-thoracic and abdominal segments, and of nearly equal proportional development. This includes Ligia, Tylus.

2. Coxæ present in first five abdominal rings only, two types.

(*a*) Narrow, so that abdomen is much narrower than last cephalo-thoracic ring. The coxæ of first and second abdominal segments concealed beneath last cephalo-thoracic segments. The third ring of the abdomen much wider than the second ——; this reaches its limits in Titanethes. This type includes Ligidium, Titanethes, Philoscia, and perhaps Dana's new genus, Scyphax.

(*b*) Coxæ present as before, but extremely narrow, and not concealed beneath cephalo-thoracic rings. This includes Itea (?), Philougria, and probably Trichoniscus, and Deto.

3. Coxæ present in third, fourth, and fifth segments. In the first and second segments the coxæ, if developed, are so linear as not to be recognisable. This includes Porcellio, Oniscus, and probably Platyarthus. Scyphax also, judging from the figures, belongs to here; it may, however, form a distinct type, as the coxæ of the second appears to be developed. The animal figured by Dana as the young of this genus can scarcely be so, unless it be an exception to all the rules which regulate the form of the young in this family. He has himself proposed to call it Actæcia.

4. Coxæ present in second, third, fourth, and fifth rings, the sixth reduced to its minimum: Armadillo, Sphærillo.

II.—*The Form of the Head.*

We shall next examine the arrangement of the various parts of the cephalic segment, or, as I have called it, the *head;* these are of minor importance, but still assist much in classification. It will be necessary to examine the native genera in detail.

Ligia, Plate XX., Figs. 7 to 10.

When the head is looked down on from the front, we remark anteriorly just beneath but not attaining to the frontal line of the head, a broad plate extending over the *entire* forehead, and divided transversely by a raised ridge; its superior margin also marked by a raised ridge. This superior ridge passes off on each side beneath the eyes, forming at least a third of the inferior border of the orbit. The external angle of the orbit, however, is formed, not by this, but by the cephalic ring continued forwards from behind, and terminating as a rounded knob just above the external antennæ; these arise in the angle between the inferior border of the frontal plate and the projecting lobes. The inferior border of the frontal plate is formed of two curves, convex upwards, one over the origin of each external antennæ; the angle of their junction is

truncate, separated by a short transverse suture from a small, narrow, somewhat quadrilateral plate, which bears the internal antennæ, and is probably the remains of the second or internal antennary ring, the frontal plate itself representing the external antennary or third ring of the typical crustacean; beneath this is a broad, well-marked plate, the epistome.

Philoscia. Plate XX., Figs. 1 to 6.

The inferior border of the frontal ring is nearly straight across, the transverse suture well marked, nearly on a level with the superior margin of the external antennæ, its superior margin curved, raised, and passing slightly beyond the frontal line of the cephalic segment, shutting out the orbit from the insertion of the external antennæ, and a deep sulcus separating it from the external angle of the orbit, the third ring being thus transverse and narrow. The second ring is nearly as deep as the third, and well marked; the epistomal plate narrow, and formed of two triangles placed apex to apex. The orbits are open below and behind.

Philougria. Plate XXI., Figs. 1 to 4.

Nearly a similary arrangement prevails, but the lateral ridges around the insertion of the external antennæ are somewhat more strongly marked.

Oniscus. Plate XXI., Figs. 5 to 7.

The external angles of the superior margin of the third ring are produced into a broad lobe, which covers over the origin of the external antennæ, it is then continued across, projecting slightly over the frontal line of the cephalic segment; the transverse suture is well marked. The second ring very narrow, almost obsolete. The lateral lobes are continued backwards, and are separated by a suture from the external inferior border of the cephalic segment, which completes the orbits.

Porcellio. Plate XIX., Figs. 1 to 10.

External angles of third antennary segment still more developed, the superior margin raised into a lobe which projects above the frontal line of the cephalic segment, and gives the head a trilobed appearance. This lobe, though sometimes badly marked, *Porcellio pruinosus* (*Br.*), *P. frontalis* (*Lereb.*, not *Edw.*), for example, is present in all the species I have had an opportunity of examining.

Armadillium. Plate XXI., Fig. 3.

The eyes are supported on the cephalic segment alone, the margin of this is raised, forming an angular projection in the middle of the forehead, passing back from whence, as before stated, it forms the orbital margin, to the entire exclusion of the third segment, the lateral lobes here being remarkably small, and derived entirely from the cephalic segment.

The superior margin of the third ring commences beneath the lateral lobes of the cephalic segment, a suture marking its origin, and the margin of cephalic border concealing it, thence it gradually emerges, passing inwards, and rises above the frontal border as a prominent arched plate, which projects over the frontal line, and is visible from behind.

Its surface presents the following markings, beginning below:—In the centre, arising from the transversal suture which divides the second and third segments, two divergent ridges passing out on each side, terminate at the extremities of the arched superior margin; external to each of these is a deep sulcus; bounding the outer edge of this sulcus a curved raised ridge surrounds the insertion of each external antennæ, and terminates as a large lobe on the outer side of the head; these are the lobes which are described by authors as the lateral lobes in the Armadillinæ, and which differ from the lateral lobes of the Oniscinæ in the place of their origin being from the inferior, not superior, margin of third ring.

The second ring is well marked, transversal, and prolonged on each side into a trigonal point beneath the external antennæ, the lobes bearing the internal antennæ on their summits. When at rest the external antennæ lie buried within this sulcus, curled over between the lateral lobes of the third and fourth, or cephalic, segments.

We have then the following rings represented: the first antennary (i. e. second normal ring); the second antennary (third normal). As to the first (or ophthalmic) ring, it scarcely seems to exist; what I have called the lobes of the superior ridge may represent it, but I think rather they are the epimerals of the third ring.

Of these parts the most important to be attended to are the median lobe, formed, as we see in Porcellio, by the *superior* margin of the third or external antennary ring; and the lateral lobes, formed in Oniscus and Porcellio by the superior margin of the same ring, and in Armadillium by the inferior margin; for while undoubtedly generic in their characters, they also assist us materially, in conjunction with other characters, in the formation of families.

On analysis, then, we get the following types of cephalic characters in the groups:—

1. Head furnished with lateral lobes arising from *inferior* margin of third ring; median lobe arched, prominent, forming a triangular plate, vertical to frontal line. Genera—Armadillium, Armadillo, Spherillo (?), Cubaris, Scyphax (?).

2. (*a*) Head furnished with lateral lobes arising from *superior* margin of third ring; median lobe prominent, in the same plane as the frontal line—Porcellio.

(*b*) Head furnished with lateral lobes, arising from the *superior* margin of the third ring, which is emarginate in the centre—Oniscus.

3. The superior margin of third ring nearly straight, neither lateral nor median lobes, terminating externally at the external angle of orbits —Philoscia, Philougria, Itea (?).

Itea is described as having small lateral lobes.

4. The superior margin as in No. 3, but not rising above inferior border of orbits—Ligia, Ligidium (?).

There may be, and probably are, two other types at least, viz., that of Scyphax, and Titanethes, but I have only seen figures of these, the latter is described as having large lateral, but no median lobes.

These naturally lead us to consider the characters of the antennæ; and here we are dealing with organs whose importance has been to a certain extent recognised, though apparently neither has their full nor true bearing on classification been hitherto considered. The number of joints without any reference to the more important character of form, has been too much relied on, and hence some most incongruous groupings, as of Philoscia and Oniscus, have been made; but of this more anon: first, to consider their general structure:—

III. *The Characters of the Antennæ.*

First, of the *Internal antennæ.*—These are merely rudimentary through the entire group, generally consisting of but three short articulations (Porcellio has four), and seldom passing beyond the front. They are inserted internal to, and at the base of, the external antennæ; they afford but little assistance in classification, for although they have been made use of to distinguish genera, in the higher divisions they are useless as diagnostic characters. We pass then to the next or—

External antennæ.—These are invariably simple, being made up of a peduncle, which is pretty constant in its characters, and a filament or tige, which varies much, and therefore affords good classificatory characters. The peduncle invariably, as far as we know, consists of five joints: in some, as Ligia, a sixth appears to exist, but a little examination will show this to be a part of the third ring. The only joint which affords any useful character is the second, which, in some genera, as Armadillium, Porcellio, and Oniscus, is narrow at its articulation with the first ring, and then suddenly swells out into a broad expanse, contracting again slightly towards its articulation with the third joint; while in others, as Philoscia, Ligia, Philougria, Itea, and Ligidium, the second joint is globular: another argument for the separation of Philoscia and Oniscus. The carvings and sulcations on the joints of the peduncle, however, occasionally afford useful specific characters.

From the extremity of the peduncle arises the filament, and of this, trusting to form alone, the seven following types have been described. This organ has attracted much attention; but unfortunately, as I said before, too much attention has been paid to mere number, and too little to form.

Regarding form only, we find the filament constructed on three types:—

1st. The articulations are short, globular, cupped at their upper extremities, which are fringed with hairs, and receive the inferior portion of the articulation next succeeding. These filaments are all, as far as I

can learn, multi-articulate. Examples—Ligia, Ligidium, Titanethes, Styloniscus.

2nd. The articulations elongated, somewhat flattened, and generally covered with hair, few in number, gradually tapering, but not subulate, the terminal one terminating in a narrow articulated hair. Examples—Oniscus, Porcellio, Philoscia (?), Armadillium, Armadillo, Spherillo, Tylus, Scyphax, Platyarthus (?), Deto (?).

The characters of the second articulation of the peduncle, as hinted above, divide these into two groups.

3rd. The articulations few in number, the whole filament gradually tapering, subulate, and perfectly naked, terminating in a tapering filament. Examples—Philougria, Itea, Trichoniscus (?).

In all these genera the number of joints in the antennæ has been used as a generic character by Brandt, &c., except Ligia, Ligidium, and Platyarthus; but in grouping the genera no regard has been, as far as I know, paid to the far more important character—that of the form of the tige.

Dana states that number of articulations of the tige is of no value as a character, and instances as a proof it the genus Scyphax, in which he states that in the young the tige has its apex with the rings half marked. From the character of the figure it is apparent the drawing was made from a dead specimen, probably a dried one, in which, owing to the contraction of the tissues, circular cracks had taken place, a fact which any microscopist who examines the antennæ of many of the Cloportides under the glass must be fully aware of. The specimen also which he figures as the young of Scyphax, judging from its tail appendage, can scarcely belong to that genus at all; at least, though I have carefully examined the young of all our native genera, most of them recently hatched, yet I never met an instance in which the tail appendages differed much from that of the full-grown animal: but we will speak of this anon in our enumeration of genera.

There is one objection which has been started to using the characters of the tige as generic, which must be noticed, i. e. that in the young the number of joints are less than in the adult. This statement is only partially true. For instance, in most of the genera in which the antennæ are multi-articulate, the antennæ of the young and adult differ much; but in those of the second and third types, given above, in some species there is no difference at all, the articulations being all present, though the terminal ones are much shorter than normal. This is the case, for instance, in very young *P. pruinosus* and *P. scaber*, even when the coxæ of the seventh cephalo-thoracic segments and the legs of the same pair are absent: and even where it holds good there can be no mistake, for other characters, such, for instance, as that noted above, the absence of the seventh coxæ, at once marks the animal as immature; hence I think Dana is wrong in making sub-genera of Trichoniscus, Porcellio, and Oniscus, merely because the number of joints in their antennæ have been too much dwelt on.

IV.—*Form and relations of the last abdominal ring and its appendages.*

Although the characters of these latter have been long employed in diagnosis, yet it would appear that their true homological value has neither been appreciated nor understood: for, although in all the genera of this group their presence has been recognised under the names of "*abdominal false feet*," "*caudal appendages*," and "*appendages of the last segment*," yet, as far as I am aware, the true relations subsisting between them and the so-called "thoracic" feet have been either overlooked or only hinted at.

Their structure in all the genera is pretty much the same: a broad basal joint, articulated somewhere at the termination of the last abdominal ring, and furnished (except, perhaps, in Tylos, which I have never seen) with a pair of dissimilar appendages, the external generally broad, the internal pointed and linear, and inserted above the external; or, to speak more correctly, an appendage of two or more articulated joints, the basal joint furnished at its inner side with an accessory appendage; that is, a foot, in which the second (the first being the posterior angle of the ring), third, and fourth, &c., articulations are present, the second, or ischium, being furnished with an appendage.

That this is the true nature of the organ appears from the following:—

1st. The mode and point of articulation of the peduncle (basis) with the last abdominal segment.

2nd. The mode of articulation of the so-called external appendage (ischium) and peduncle (basis).

3rd. The difference in form and relation between the internal (accessory filament) and external (ischium) appendages.

1st. The mode of articulation of the peduncle.

By reference to the observations on the so-called "epimerals and posterior angles of the abdominal rings," it will be seen that, taking into consideration the ultimate segment only, two principal types exist, viz., those in which "epimerals" or coxæ exist, as Ligia, and those in which these organs are absent, as Oniscus, Porcellio, and, perhaps, Philoscia, &c.

Now, if we examine these, we will find that the point of articulation between what we have called the peduncle, and the last abdominal segment, is different in these two types.

In the first (Ligia, for instance), it takes place at the posterior margin of the ring, in a notch formed between what I have considered as the coxæ and the posterior margin of the ring, by the whole superior border of the peduncle, which is broad and flat, the exterior angle of which forms a regular ball-and-socket joint, which is received into a regular notch in the posterior angle of the ring, exactly similar to the notch on the under side of the "*epimeral*" of the cephalo-thoracic ring.

In the other (Oniscus, to wit), the inferior portion of the peduncle is narrowed, so that it appears to be articulated by the exterior angle only,

the interior border being produced into a lobe, and attached to the extreme exterior edge of the last ring, or rather to a process of this ring, visible only below, and which may be looked on as the coxa reduced to a minimum and fixed to the ring; the form of articulation is the same as in Ligia.

This view of relations receives further confirmation on examination of the last abdominal ring in Philoscia and kindred forms, where the articulation is completed externally by a small triangular lobe, differing from the angle in Ligia only in size; indeed, it is a question whether I am strictly correct in describing Philoscia as wanting the "coxa" in the sixth abdominal ring, and not as having the coxæ fused to the ring.

The mode of articulation dependent on the development of coxæ in the last ring causes the peduncle to be more or less uncovered by the preceding coxæ, and has given rise to the erroneous description of Brandt, already referred to, viz., "Ligiæ—Caudal appendages, one pair" (Conspect., page 9); Oniscinæ—"Caudal appendages, two pairs" (ib., page 12); the absence, or rather complete fusion, of the coxa with the last ring causing the peduncle in Oniscus, &c., to be completely covered by the coxæ of the fifth rings, led Brandt to overlook its existence altogether, and to mistake the terminal appendages for separate organs.

2nd. The mode of articulation of the so-called external appendage (ischium), and the peduncle (basis).

This is always at the *extremity* of the peduncle, and generally on a plane inferior to that of the so-called internal appendage, the peduncle being hollowed out into a regular joint for its reception, and the external border of the peduncle terminating inferiorly in a tooth outside the articulation; the internal, on the other hand, arising from a lateral process, more or less distinctly marked, and generally on a plane much superior to the articulation of the external appendage. This is evident, even in such forms as Ligia, where the apex of the peduncle being truncated, the appendages arise from nearly the same point, the lateral process being slightly larger than the real apex, or as Ligidium, in which the lateral process is still further elongated, so that the ischium appears to arise above the internal appendage.

From this extreme we trace the lateral process till we arrive at such forms as Oniscus, where, without careful examination, we might doubt its existence at all, and where, to a superficial examination, the internal appendage appears to have no connexion with the peduncle at all, but rather to spring directly from the last ring: but more of this genus anon.

3. The difference in form and relations between the external (ischium) and internal (accessory filament) appendages.

Besides the difference between these two, displayed in the fact of the one (ischium) being articulated to *the extremity*, the other (accessory filament) to the *lateral* process of the peduncle, the differences of the two are remarkable.

The external (ischium) is generally more or less compressed, often abrupt at its termination, and generally ending in a tuft of hairs.

The internal (accessory filament), on the other hand, is rounded, spine-like, generally made up of more than one articulation, and terminates in a hollow hair, or rather becomes filamentous, presenting, in short, all the characters of a true accessory appendage; it is from this character I have named it the accessory filament.

Having established these relations, next for a detailed description of the entire organs, i. e. first, the peduncle or basis; second, ischium; third, accessory filament.

1. *The Peduncle or Basis.*—This is attached to last abdominal ring, and is either somewhat quadrilateral, without distinct lateral process, its inner margin dilated into a lobe (Ligia).

Or else somewhat triangular; its internal margin produced into a rounded process, which bears the accessory filament (Philoscia, Oniscus).

The lateral process (obsolete in Tylos) is either distinct, produced beyond, and arising from inner angle of the apex of the peduncle (Ligidium), arising from near the base of the peduncle (Oniscus, Porcellio); or else indistinct, and almost on the same level as the apex (Ligia); between these, every gradation of development exists. The peduncle may, in fine, be described in general terms as a flattened articulation, generally furnished internally with an accessory appendage, bearing the ischium on its summit, and more or less covered by the last abdominal ring, from whence it arises.

2. *The Ischium or External Appendage.*—This articulates to the apex of the basis or peduncle, and is either—

Rounded, its base dilated and flattened, hairy and scabrous; its apex abrupt and tufted with hairs (Ligia, Philoscia, Scyphax, Ligidium (?), Tylos (?), Sphærillo).

Rounded, somewhat subulate, its base slightly dilated and compressed, smooth (Philougria, Itea (?), Titanethes (?), Styloniscus (?).

Flattened, acuminate, dilated, hairy, scabrous (Oniscus, Porcellio, Scyphax (?)).

Flattened, dilated, squared, apex truncate or rounded, broader below than above, hairy (Armadillium, Actecia (?), Armadillo).

Accessory filament or internal appendage, either—

Tapering, rounded, terminating in a jointed filamentous hair (Ligia, Philoscia, Philougria), or—

Flattened, apex truncate, wider than base, club-shaped, fringed with hairs (Armadillium); or—

Obsolete (Tylos).

The published details of foreign genera are so inaccurate that I must confine myself mainly to our native species in my description of types, merely glancing at one or two of the former, of which sufficient details have been published. Those which have no British representatives are marked with an asterisk.

1. **Peduncle* operculiform, triangular, broader above than below, articulated beneath last abdominal ring. *Lateral process* obsolete; ischium short, subulate (?), articulated to apex of peduncle. *Accessory appendage*, none (Tylos).

2. *Peduncle* irregularly quadrilateral, much broader than long, outer side produced, articulated by lower margin beneath exterior angle of posterior border of the last ring; entire peduncle almost covered by the ring. *Accessory lobe* triangular, springing from base of peduncle, scarcely half length of peduncle. *Ischium* irregularly quadrilateral, base much narrower than apex, which is transverse; inner side produced at apex, borders hairy. *Accessory appendage* nearly twice length of ischium; base rounded, narrow; apex flattened, club-shaped, hairy and scabrous (Armadillium, Armadillo (?). To this neighbours, probably, Sphærillo and Diploexochus). Plate XXI., Figs. 12, 13.

3. *Peduncle* triangular, much longer than broad, articulating border notched at outer angle, outer margin produced into lobe at base, apical angle well marked, apex half breadth of base, articulated to *exterior* angle of last ring beneath. *Accessory lobe* distinct, quadrilateral, about third length of peduncle, arising from articulating margin, completely covered by last abdominal ring. *Ischium* compressed, acuminate, trigonal, lobed on inner side, hairy. *Accessory appendage* curved, trigonal at apex, lobed at base, terminating in filament, two-thirds concealed beneath terminal ring, two-thirds length of ischium (Porcellio, Oniscus (which has accessory lobe nearly obsolete), Platyarthus, probably). Plate XX., Fig. 11.

4. *Peduncle* quadrilateral, transverse, twice as broad as long, superior articulating border produced into an angle, articulated to *lateral* border of last abdominal ring. *Accessory lobe* distinct, nearly attaining apex of peduncle, unconcealed by last ring. *Ischium*—base flattened, apex acuminate, bi-articulate, hairy, and spined along edges. *Accessory* appendage falciform, hairy, apex blunt, three-fourths of length of ischium (Philoscia).

5. *Peduncle* somewhat triangular, as long as broad, superior border terminating internally in an angle, articulated in a notch of the posterior linear border of the last ring, which passes back below coxa of fifth ring. Exterior margin produced into a triangular lobe. *Accessory lobe* triangular, distinct, nearly attaining apex of peduncle, unconcealed. *Ischium* subulate, somewhat trigonal at base, terminating in a long filament, smooth. *Accessory appendage* curved, needle-shaped, smooth, nearly equal in length to ischium (Philougria, Itea (?), and probably also Trichoniscus).

6. *Peduncle* quinquangular, oblong, superior border narrow, articulated in a distinct notch at the posterior margin of ring; apex truncate; exterior angle acute; lateral lobe obsolete. *Ischium* elongated, trigonal, rough, hairy. *Accessory appendage* rounded, subulate, slightly larger than ischium, terminating in a filament (Ligia).

Besides these there are several intermediate forms, as Ligidium, in which the accessory lobe far exceeds apex of the peduncle—Actæcia (*Dana*), in which the external angle of apex is produced into a lobe, so that the ischium appears to be lateral; but sufficient has been said on the subject.

The whole of these appendages are capable of reproduction, and it

is common to find Ligia with them in a rudimentary state. They preserve their comparative characters, even in the young state of the animals, the only difference being, that the accessory lobe is somewhat more strongly marked, and afford the most valuable of all the characters which I have mentioned, for fixity of a type.

The order of value of these characters is:—

Generic. 1st. Appendages of, and last ring of abdomen.
2nd. Arrangement and form of external antennæ.
3rd. Proportional development of coxæ of abdominal rings.
4th. Development of antennal rings.

Familiar. 1st. Appendages of last ring of abdomen.
2nd. Proportional development of coxæ.
3rd. Arrangement and form of external antennæ.

The characters of the internal antennæ and of the parts of the masticatory apparatus are chiefly of familiar import: they are so difficult to establish that I have omitted them in this rough sketch, which is put forward merely as an attempt at a more natural arrangement of these genera than those published. It will be found that I have also omitted all mention of the internal anatomy for the present.

Many of the foreign genera are so scantily described, that it would be foolish to attempt anything like generalities here, and this whole paper, as I said before, is merely provisional, the rather as I hope before long to examine into, not merely genera, but species, as at present far too many false ones incumber our systems.

Provisional Arrangement of Families.

The genera described are British.

Family.—TYLIDÆ.

Genus 1.—Tylos (*Latreille*).

Family.—ARMADILLIDÆ.

Genus 1.—Armadillo (*Brandt*).
Genus 2.—Cubaris (*Brandt*).
Genus 3.—Sphærillo (*Dana*).

Genus 4.—Armadillium (*Brandt*).

Body semi-globose; head rounded, median lobe minute, arcuated, as a triangular shield. External antennæ: second joint of peduncle lobed. Tige three-jointed, hairy, rounded. Coxæ of first and sixth abdominal rings obsolete. False feet of last pair: peduncle flattened, lamellar, truncate. Ischium flattened, truncate; external angle produced. Accessory lobes arising from base. Accessory filament flattened, club-shaped, concealed.

Genus 5.—Diploexochus (*Brandt*).

Genus 6.—(?) Actæcia (*Dana*).

(Which probably should stand as a representative of a separate family.)

Family.—PORCELLIONIDÆ.

Genus 1.—Oniscus (*Latreille*).

Body flattened. Head transverse, lateral lobes well developed from *superior* margin of third ring, which is emarginate in the median line, not attaining to front, *passing out beneath the orbits.* Internal antennæ inconspicuous. External antennæ: peduncle, second joint lobed at base. Tige three-jointed, articulations rounded, cupped. Coxæ of first, second, and sixth abdominal rings obsolete; third to fifth, broad, curved. Abdominal false feet articulated beneath external angle of last ring. Peduncle triangular, lamellar. Accessory lobe obsolete. Ischium compressed, trigonal, lamellose, along with three-fourths of peduncle unconcealed. Accessory appendage curved, trigono-subulate, almost concealed, arising from basal angle of peduncle, which is truncate.

Genus 2.—Porcellio (*Latreille*).

Body flattened or semi-globose (*armadilloides*). Head transverse: lateral and median lobes well marked, *arising from superior margin of third ring, which surpasses frontal line, and is not continuous beneath orbits.* Internal antennæ inconspicuous. External antennæ: second joint broadly lobed internally. Tige two-jointed; articulations semi-flattened, hairy. Coxæ of first, second and sixth abdominal rings obsolete. Abdominal false feet of last pair articulated *beneath* basal angles of last ring. Peduncle triangular, lamellar, three-fourths uncovered. Accessory lobe well-marked, arising from base of peduncle, covered by last ring. Ischium compressed, trigonal, lamellose, acuminate, uncovered. Accessory filaments curved, trigonal, terminating in a filament nearly completely covered by last abdominal ring.

Genus 3.—(?) Platyarthus (*Brandt*).
Genus 4.—(?) Deto (*Guerin*).

Family.—LIGIDÆ.

Genus 1.—Ligia (*Brandt*).

Body flattened. Head transverse. Internal antennæ inconspicuous. External antennæ: second joint, peduncle without lobe. Tige multi-articulate; segments globose, cupped, hairy. Coxæ of abdominal rings: first and second small; third to sixth, well developed. Abdominal false feet articulated in notch at end of last ring, unconcealed. Peduncle quadrilateral. Accessory lobe inconspicuous from truncate apex. Ischium somewhat trigonal, scabrous. Accessory appendage as long as ischium, terminating in a filamentous hair.

Family.—PHILOSCIDÆ.

Genus 1.—Ligidium (*Brandt*).
Genus 2 (?).—Styloniscus (*Dana*).
Genus 3 (?).—Titanethes (*Schiödte*).

Genus 4.—Philoscia (*Latreille*).

Body flattened. Head rounded. Antennal ring arcuate, attaining to, but not surpassing, frontal line. Internal antennæ inconspicuous. External antennæ, second articulation, rounded without lobe. Tige, three-jointed articulations rounded, hairy, terminating in a filament. Coxæ of sixth abdominal ring obsolete, first to fifth narrow, linear. Abdominal false feet, last pair: peduncle quadrilateral, transverse, articulated to exterior margin of last ring, uncovered. Accessory lobe distinct, attaining apex of peduncle. Ischium: base flattened, acuminate, almost trigonal, bi-articulate, hairy; accessory filament falciform, hairy, apex blunt.

This genus has been misdescribed by all authors except Zadach, who gives a very fair description of it in his monograph, already quoted.

5.—(?) Scyphax (*Dana*).

(Scyphax and Philoscia may form the type of a separate family.)

Family.—ITEADÆ.

Genus 1.—(?) Trichoniscus (*Brandt*).
Genus 2.—(?) Itea (*Koch*, in part).

Genus 3.—(?) Philougria (*mihi*).

Body flattened. Head round; no median or lateral lobes. Internal antennæ inconspicuous, three-jointed. External antennæ: second joint round, not lobed. Tige subulate, five-jointed; smooth. Coxæ of first abdominal ring small and inconspicuous; second to fifth, narrow, linear, well marked; sixth, nearly obsolete. Abdominal false feet: last pair completely uncovered. Peduncle somewhat triangular, articulated in notch at posterior margin of last joint. Ischium trigonal, subulate, smooth, terminating in a filament. Accessory lobe well marked, springing from side of, and nearly attaining, extremity of apex of peduncle. Accessory filament long, subulate, filamentous, smooth.

This genus is very closely allied to Itea, which is described by Zadach as having the *exterior margin* of the peduncle of the abdominal false feet *free* lateral processes of the front; present beneath the superior frontal margin above the base of the antennæ; the internal antennæ one-jointed. Characters, if correctly given, sufficient to constitute the above a genus.

Some, perhaps, will be inclined to substitute the term genus for family in the above Table, making sub-genera of most of the genera.

Against this custom, too prevalent now-a-days, I must enter my protest: every distinct set of forms possessing one or two important parallel characters in common, should rather constitute a genus, than by, as is too often done, grouping a number of these in one genus, necessitate the formation of sub-groups, which are always most puzzling to the student, and of no use unless to the systematist addicted to *mere number* of families in some preconceived order of numeral arrangement.

List of British Species of Oniscoidea.

Family.—ARMADILLIDÆ.

Genus.—ARMADILLIUM (*Brandt*).

(Armadillidium of Brandt shortened in conformity to modern usage.)

Armadillium vulgare (*Latr. sp.*)

Synonyms: *Oniscus armadillo* (*Linn.*), *O. cinereus* (*Zenk.*), *Armadillo vulgaris* (*Latr.*), *A. variegatus* (*ib.*), *Armadillidium Zenckeri* (*Br.*), *Armadillo opacus*, *variegatus*, *Willii* (*Schæffer*).

Body smooth, elliptical; median plate arched above, scarcely surpassing frontal line. Terminal ring of abdomen narrow (coxæ obsolete), triangular: apex truncate. False feet of last pair: basis nearly completely concealed, bilobed; internal lobe much shorter than external; a raised transverse ridge on inferior face. Ischium flattened, somewhat triangular, wider below than above. Secondary appendage trigonal, broader below than above, compressed, hairy at the end. Second joint of external antennæ lobed.

Colour: dark steel-gray, almost black; steel-gray blotched with patches and spots of whitish-yellow and red browns.

Habit: rolls itself into a ball.

Habitat: dry places under stones, decaying timber, and amidst herbage.

Distribution: Ireland generally. England—London, Kent.

Family.—ONISCIDÆ.

Genus.—ONISCUS (*Linn.*).

1.—*Oniscus murarius* (*Cuvier*).

Synonyms: *O. asellus* (*Linnæus*, and *Auct.*).

Body oval, shining, covered with smooth granules; lateral lobes of head large, inclined backwards; frontal line somewhat emarginate; terminal ring of abdomen elongate, triangular, convex above; coxæ terminating as acute angle; coxæ of fifth concealing origin of accessory appendage. Accessory appendage nearly equalling ischium in length. Second joint of external antennæ lobed internally.

Colour: general ground light-gray or bluish, with blotches and patches of yellow, generally lineally arranged; a salmon-coloured variety with dark patches occasionally met near sea.

Habits: semi-rolls, and feigns death.

Habitat: under decayed vegetable and animal matter, as well in the dryest as wettest localities. Common near sea.

Localities: Ireland—east coast generally. England—Kent, London, &c. Appears to be common everywhere, but the species have not been distinguished.

2.—*Oniscus fossor* (*H. Schæffer*, D. Crus., Cah. 22, n. 22).

Synonyms: *Oniscus muscorum* (*Lereboullet*, p. 29). I cannot speak of the other synonyms given by the author, as he has confounded it with *Philoscia muscorum*. *P. tæniola* (*Koch*), given by him as a synonym, is figured as a true Porcellio by Schæffer. The figure of *O. fossor* is very characteristic.

Body oval, covered with numerous rough granulations, which give it a powdered appearance; head convex; lateral lobes moderate, rounded; frontal line produced into a triangular lobe which belongs to head, not to antennal ring; terminal ring and other characters as *O. murarius*, than which the whole animal is much smaller.

Colour similar to *O. murarius*, but paler.

Habits: semi-rolls, and feigns death; much more active than *O. murarius*.

Habitat: dryish places, as under stones, dry leaves.

Localities: Ireland—Dublin (Wexford, E. Percival Wright, Esq.). England—Epping Forest, Kent. Very common among the chalk-pits at Chisselhurst; now first recorded as British. (Three specimens in British Museum Collection undistinguished from *O. murarius*.)

Genus.—Porcellio (*Latreille*).

1.—*P. scaber* (*Latreille*).

Synonyms: *Oniscus asellus* (*Linn*), *O. granulatus* (*Lam.*). *Porcellio dubius, affinis et mult. al.* (*H. Schæff.*), *P. Brandtii* (*M.-Edwards*).

Body elongate, oval, rugous. Lateral processes very salient; external angle rounded; median process triangular; terminal ring ending in a triangular point, acuminate, deeply sulcate in the median line.

Colour: uniform grayish-black, yellow blotches on dark ground; a nearly uniform salmon-coloured variety also met with; there may be two species confounded.

Habit: runs with agility; semi-rolls itself; attacks living caterpillars.

Habitat: moist places, everywhere there is decaying matter; among sea-weed on sea-shore along with Ligia, &c. The paler varieties are found in the dryer localities.

Distribution: apparently everywhere, and very common; carries the young all through the summer.

2.—*P. dilatatus* (*Brandt*).

Synonyms: *P. scaber* (*Auct.* and *M.-Edw.*).

Body very broad, depressed, rough, and granular; lateral frontal processes very prominent, rounded at apex, and hollowed; median lobe obtusely triangular, moderate; last ring rounded at apex, plane above. Ischium very flat and broad. Much larger than *P. scaber*.

Colour: a uniform slate-gray.

Habit: crawls very slowly, semi-rolls; extremely brittle in its structure, a touch causing the limbs to fall off.

Habitat: amongst decaying grass and straw, extremely rare.

Localities: Ireland—Dublin. Now first added to British lists.

3.—*P. pictus* (*Auct.*).

Synonyms: *P. conspersus* (?), *P. serialis*, *P. crassicornis* (*H. Schæffer*).

Body as *P. scaber*, slightly elongated; lateral lobes very salient, curved outwards; median lobe curvilinear, small; body granulous, last ring triangular, acute at apex, superior surface sulcated.

Colour similar to *P. scaber*, but patches more regularly arranged; may be easily mistaken for *Oniscus fossor* at first glance, but is more shining.

Habit: runs with great agility, does not roll.

Habitat: very local; dry places, as old ruins, under dry leaves.

Localities: Ireland—Dublin (local), Belfast (A. H. Halliday, Esq.) England—Chisselhurst, Kent, among chalk-pits; now first added to British lists.

4.—*P. lævis* (*Lam.*).

Body very convex, polished; lateral frontal lobes slightly salient, small, rounded; median lobe triangular, very short; last ring, apex rounded, deeply sulcate above. The largest of our species.

Colour: lead-gray, occasionally blotched with yellow on sides.

Habits: semi-rolls, sluggish.

Habitat: common everywhere in moist places, especially in stables and litter, among grass at bottom of walls.

Localities: Ireland—Dublin. England—Kent (one specimen in British Museum Collection, from neighbourhood of London).

5.—*P. pruinosus* (*Brandt*, Conspect. 19.)

Synonyms: *Porcellio frontalis* (*Lereboullet*), preoccupied by Edwards. *P. maculicornis* (?) (*H. Schæffer*).

Body sub-ovate, oblong, slightly rugged, downy. Lateral lobes small, rounded. Median lobe rounded, minute, almost linear; last ring triangular, acute at apex; surface plane. Feet very long. Abdomen much narrower than cephalo-thoracic rings.

Colour: uniform mouse-colour, marbled under the lens with white.

Habit: runs with great agility, concealing itself rapidly from the

light; preferring moderately humid, warm situations; one of the commonest of our species. It buries itself to a considerable depth in clay.

Locality: Ireland—Dublin; everywhere. England—Kent, Chiselhurst, very common. (Three specimens (unnamed) in British Museum Collection, from neighbourhood of London, belong, I believe, to this species. They are stuck on cards, rendering examination impossible.) Now first added to British lists.

6.—*P. armadilloides* (*Lereboullet*).

Synonyms: *O. convexus* (*Degeer*), *O. saxatilis* (*Hartmann*).

Body elongated, elliptical; segments very convex, smooth. Lateral lobes minute, truncated in front. Median lobe very short, angular, acute. Last ring of abdomen acute, plane, or slightly convex above.

Colour: iron-gray, with clear borders to segments; a band of white blotches along either side of the median line. Never having seen it alive, cannot speak of its habits. Rolls itself into a perfect ball.

Added to British lists on authority of six specimens in British Museum Collection (unnamed), which A. White, Esq., informs me were captured near London (Highgate) (?) by Mr. Walker.

7.—*P. cingendus* (*n. s.*) (*mihi*). Plate XIX., Fig. 1.

Body elongate, ovate, *smooth, or slightly scabrous*. Lateral lobes minute, rounded, directed downwards. Median lobe nearly obsolete, arcuate. Terminal ring broadly triangular; apex acute, plane above; a raised continuous line along upper margin of each ring. Whole animal shining, smooth, or covered with minute shining granulations only. Closely allied to *P. pruinosus*, from which it differs chiefly in the smooth, shining body, and the coxæ of cephalo-thoracic rings having their posterior angles rounded off.

Colour: bright red and yellow blotches on a dark steel-gray ground.

Habits: runs with extreme rapidity; inhabits dry stations exclusively, as under leaves; never rolls itself into a ball.

Localities: Dublin, very rare.

The characters given above are constant, easily distinguishing it from *P. pruinosus*, which, when young, resemble the parents. I can find no description in authors approaching this species, and am, therefore, compelled to give it a name. I find it both in company with *P. pruinosus*, and also alone.

Family.—LIGIDÆ.

Genus.—Ligia.

1.—*Ligia oceanica* (*Lin. sp.*)

Synonyms: *Oniscus oceanicus* (*Linn.*), *P. aquaticus* (*Baxter*), *Cymothoa oceanica* (*Fabric.*), *Ligia oceanica* (*ib.*).

Body flattened, oval. Head transverse, covered with smooth granulations. External antennæ shorter than body. Tige multi-articulate,

sub-glabrous. Terminal ring of abdomen: posterior border regularly arcuated in the middle. Coxæ as acute angles. Abdominal false feet: peduncle oblong, slightly shorter than last abdominal ring. Ischium and accessory appendage twice the length of peduncle.

Colour: yellowish-brown, the young prettily diced with white.

Habits: runs with agility, or rolls up extremities of body, and feigns death; very common among vegetable debris, along tide-marks, and on rocks; seldom takes water; may be seen running over sand in full sunshine.

Common around Ireland.

Family.—PHILOSCIADÆ.

Genus.—Philoscia (*Latreille*).

1.—*Philoscia muscorum* (*Latreille*). Plate XX., Fig. 1.

Synonyms: *Ligia melanocephala* (*H. Schæffer*), *Oniscus sylvestris* (?) (*Fabric.*), *Oniscus muscorum* (?) (*Cuv.*). I have not been able to verify the reference queried. *Philoscia muscorum* (*Zaddack*, Syn. Crust. Prussic., p. 14).

Body flattened, elliptical, perfectly smooth and glistening. Head transversely elliptical, arched in front; neither lateral nor median lobes. Internal antennæ three-jointed. External antennæ: second joint of peduncle not swollen at base. Tige three-jointed; articulations rounded, tumid, the last terminating in a hair, a long spine at apex of fourth and fifth articulations, all the articulations both of peduncle and tige densely hairy. Coxæ of abdominal rings somewhat linear; abdomen abruptly narrower than seventh cephalothoracic ring. Last ring broadly triangular; apex acute. Abdominal false feet, last pair, attached to exterior margin of ultimate ring, uncovered. Peduncle somewhat quadrilateral. Ischium trigonal, spinous along edges, fine hairs between spines, with a slender filament at its apex. Accessory appendage not quite half length of ischium rounded, hairy. Accessory lobe triangular, distinct, nearly attaining apex of peduncle.

Colour fulvous, with dark black patches, a dark stripe generally along median line. A pale salmon-coloured variety was brought me by E. Percival Wright, Esq., from Wexford, which I have found since rather common on Bray Head, county of Wicklow, and occasionally about Donnybrook, county of Dublin.

Habitat: dry places among leaves, also among sand hills, along seashore, under stones; common near sea.

Habits: runs rapidly, feigns death, but does not roll into a ball.

Localities: Ireland—Dublin, extremely common; Wicklow, Meath, (Wexford and Cork, E. Percival Wright, Esq.), Belfast (A. H. Haliday, Esq.) England—Middlesex, Essex, Kent, common.

A species which has been much misunderstood, although an extremely common species.

Family.—ITEADÆ.

Genus.—PHILOUGRIA (φιλος ὑγρος) (*mihi*).

1.—*Philougria celer* (*mihi*). Plate XXII., Fig. 1.

Body semi-flattened, elliptical, perfectly smooth and shining. Head oval, twice as broad as long; neither lateral nor median lobes extant; antennal plate attaining to frontal line. Eyes small, oval, situated at posterior angle of head. Internal antennæ small, inconspicuous, three (two ?) jointed. External antennæ moderate in length, generally curved, folded in form of (ℵ). Peduncle five-jointed, attached to detached segment (epimeral ?) of ring, hence apparently six-jointed. First articulation very short, transverse; second, obtusely triangular, longer than first; third, globular equal to second; fourth, elongated, slender, sides parallel, equal to second and third conjoined, its exterior superior angle truncate, inner angle ending in a long hollow spine; fifth, slenderest, and slightly longer than fourth, sides nearly parallel, internal margin produced into four angular eminences, each of which bears a short spine, external angle terminating in a filament, external border hairy. Tige five-jointed, filamentous; articulations cylindrical, gradually tapering; first, short; second, third, and fourth, equal; fifth equalling second, third and fourth conjoined; terminating in a filament; perfectly free from hairs or spines. Coxæ of cephalothoracic segments well marked. Segments of cephalothorax: first, much broader than head, second and third gradually broader; third and fourth equal; fifth, sixth, and seventh gradually decreasing in breadth; seventh as broad as first. Posterior margin of first three rings convex downwards; fourth and fifth, median portion convex downwards, coxæ concave upwards; sixth and seventh rings concave downwards, their coxæ quadrilateral, strongly angular, suture well marked; coxæ of the seventh extending half-way down fourth abdominal ring; raised transverse border along margin of each ring; a border of small spines along lateral edges of coxæ (visible under $\frac{1}{4}$ inch power). Abdominal segments: first, semilunar, very linear, coxæ nearly obsolete, covered by those of seventh cephalothoracic segment: second, linear, coxæ rounded, uncovered by seventh cephalothoracic ring; third, fourth, and fifth, each equal in breadth to first and second conjoined; coxæ well marked and curved, inferior border of entire segment convex medianly and deeply concave externally, so as to form a projecting angle, gradually decreasing in breadth from third downwards; terminal ring deeply concave over insertion of last false feet, the segment being here linear, coxæ nearly obsolete, medianly produced, truncately triangular, apex deeply emarginate; total length of ring about twice that of fifth; the rings gradually increase in length from one to six. Abdominal false feet: last pair uncovered, articulated in excavated posterior margin of last ring. Peduncle, and ischium, and accessory filament, as in genus, *q. v.*

Colour: uniform red brown, without spots or marbling, though varieties may occur.

Habits: runs with agility, as conveyed in the name; buries itself deep in the ground, and generally congregates in numbers; very impatient of dryness, soon dying on exposure to air.

Habitat: very moist places, amongst all kinds of decaying matter; also amongst moist dead leaves, amongst wet ashes, in moss, at roots of trees: extremely common. I cannot account for this species remaining so long undetected in Britain.

Localities: Ireland—Dublin, very common (Wexford, Cork, and Kerry, E. Percival Wright, Esq.).

England—Epping Forest, near London, Kent, Chisselhurst, where it seems as common as in Ireland.

Now first added to British list.

In many Papers, the references to the Plates not being as definite as we could wish, we have thought it better to append separate, carefully drawn-up Descriptions of Plates. These have been furnished to us by the authors of the papers, except in a few cases, where such assistance was not needed; and we trust that they will add to the importance of the many valuable Original Communications which this volume of the "Natural History Review" contains.—Eds. N. H. R.

DESCRIPTIONS OF PLATES.

PLATE I.

ILLUSTRATIVE OF A PAPER, BY J. R. KINAHAN, M. B., M. R. I. A., ON ANNELIDOID TRACKS IN THE ROCKS OF BRAY HEAD, COUNTY OF WICKLOW.

Fig.

1. Tracks in gray beds of *Oldhamia radiata*, showing (*a*) vertical tubes; (*b*) thread-like do.; (*c*) laminated structure of tubuli.
2. (*a*) Vertical tubes; (*b*) thread-like parallel tubuli.
3. Tracks from red bed, showing crossing tubuli.
4. Vertical tubulus from green quartzose rock.
5. Tracks in red beds, showing tubulus curved on itself, in connexion with *Oldhamia antiqua*.

Note.—The Oldhamia occurring in connexion with the tubuli is not shown in Figures 1, 2, 3, and 5.

Vide page 20.

PLATE III.

ILLUSTRATIVE OF A PAPER, BY REV. PROFESSOR HAUGHTON, ON SOME DISTORTED FOSSILS FROM THE CLEAVED ROCKS OF THE SOUTH OF IRELAND.

Fig.

1. *Orthis crenistria,* from Carboniferous slate of Ardoginna, county of Waterford, with its fringe line perpendicular to the intersection of cleavage and bedding.

1A. Do., from Carboniferous slate of Carrigaline, county of Cork, with its fringe line drawn out in the line of intersection of cleavage and bedding.

1B. A fossil from the same locality as the last; but so changed by cleavage, both in and perpendicular to the plane of bedding, as to be hardly recognisable. I name it, with considerable hesitation, *Productus caperatus.*

1c. A beautiful specimen of *Euomphalus pentangulatus,* distorted by cleavage, from Little Island, county of Cork, where these distorted fossils occur in great abundance in limestone.

Figs. 2, 2A, 2B, 2c, represent the distortion reduced in the proportion of 5 : 4.

Vide page 96.

PLATE IV.

ALSO ILLUSTRATIVE OF REV. PROFESSOR HAUGHTON'S PAPER ON CLEAVAGE.

(See previous page.)

Figs. 3, 3A, 3B, 3C, represent the distortion reduced in the proportion of 5 : 3.

Figs. 4, 4A, 4B, 4C, represent the distortion reduced in the proportion of 5 : 2.

Vide page 96.

PLATE V.

THIS PLATE IS ILLUSTRATIVE OF A PAPER ENTITLED, "RESEARCHES AMONG THE PALÆOZOIC ROCKS OF IRELAND," BY MR. KELLY.

(For this Paper see "Natural History Review," vol. iii., Proceedings of Dublin Geological Society, p. 115.)

Fig.

1. *a*, a strong conglomerate at Sybil Head, about 60 feet thick; the base of the Carboniferous formation dipping N. W. 60° into the Atlantic, and lying unconformably on the ends of the brownstone strata from *a* to *b*.

g, *m*, *n*, *h*, *i*, supposed the original surface of the land.

m, *n*, *o*, *p*, a fossiliferous band of rock.

h, *k*, a supposed line of fault or slip.

c, *k*, a greenstone protrusion at Clogher Head.

b, *k*, the white part of a fossiliferous band at Ferriter's Cove, supposed to have slipped down from the position *m*, *n*, on the line *h*, *k*, and to be the equivalent of *c*, *p*, *o*, *d*: a similar fossiliferous band at Doonquin Old Church; each band a part of the original *m*, *p*, *o*, *n*. See pp. 15, 16.

At *d* the lithograph is defective: the white between *d* and the line *n*, *o* should be shown as grit and slate, the same as between *d* and *e*.

2. A, B, represents the Old Red Sandstone conglomerate; over it is the Old Red Sandstone, shown as dotted; next the Limestone, white; and lastly, the Coal Rocks, shaded with close horizontal lines.

a, Granite.
b, Stratified quartz rock.
c, Mica slate.
d, Primary crystalline limestone.
e, Greenstone.
f, Amorphous quartz rock.
g, Gray clay slate.
h, Gray grit.
i, Red clay slate.
k, Green grit.
l, Green chloritic slate.
m, Brownstone.

PLATE VI.

ILLUSTRATIVE OF A PAPER, BY JOHN KELLY, ON THE SUBDIVISIONS OF THE CARBONIFEROUS FORMATION IN IRELAND.

Fig.

1. Sketch on the shore at Bundoran, at low water: *b*, *c*, *d*, a ravine; *c*, *e*, a vertical fault, having the dotted part *d*, Old Red Sandstone, on one side of it; the shaded part *b*, Carboniferous slate, with fossils, on the other.
2. Sketch of section at Kildoney, near Ballyshannon: the dotted part Old Red Sandstone, the other part limestone; *b*, *d*, a vertical fault between them, which brings the two rocks into juxtaposition at the surface.
3. Sketch of section on the shore at Cultra, four miles N. E. of Belfast: from *a* to *b* red sandstone; from *b* to *c* gray and black shale, containing scales of Holoptychius and Paloeniscus, with Modiola, and others; *c*, *d*, red sandstone; *d*, *e*, yellow magnesian limestone; *e*, *f*, red sandstone; *f*, *g*, thin beds of bluish-gray limestone and red sandstone alternating; *g*, *h*, red sandstone. At *c*, *d*, *e*, *f*, *g*, whin dykes, generally vertical.
4. Sketch section from Shean Hill, on the south, across a part of Lough Erne to Portinode, on the north: A, *a*, bands of millstone grit on the different sides of the fault *e*, *f*, and geological equivalents; B, *b*, limestone groups, and equivalents also; C, *c*, Carboniferous slate, same; D, *d*, Old Red Sandstone, same; *g*, a talus of *debris* at base of cliff adjoining the fault; *h*, a part of Lough Erne.
5. Sketch section near Bundoran, looking N. W.: *a*, a band of millstone grit; *b*, limestone in Dartry mountain; *c*, Carboniferous slate, which lies in conformable succession on *d*, the upper part of the Old Red Sandstone, which here, as in most other places, is yellowish; *e*, Carboniferous Slate, separated from *d* by a fault; *f*, limestone at Finner Point, the junction with *e*, not clear, being covered with sand.
6. Sketch section through the Slievebeagh mountains, from Monagh to near Clogher, looking westward: *a*, *b*, sandstones and shales of the Coal series alternating; *c*, Carboniferous Limestone; *d*, Carboniferous Slate; *e*, Old Red Sandstone; *f*, Graywacke, or gray clay-slate and grit alternating; *g*, brown grit, with red and purple shales alternating, the grits resembling those near Ferriter's Cove, Dingle.

Vide page 100.

PLATE VII.

ILLUSTRATIVE OF A PAPER, BY RICHARD GRIFFITH, LL. D., ETC., ON THE SUBDIVISIONS OF THE CARBONIFEROUS SYSTEM.

Section 1 is across the Lugnaquilla, Cuilgagh, and Slieve Rushen mountains, to Rosskeeragh, near Butler's Bridge, in the county of Cavan, showing the relative positions of the several members of the Carboniferous system in Ireland.

Section 2 is through the Yellow Sandstone district, north of Lough Erne, exhibiting a complete sequence of the several members of that group of rocks, succeeded conformably by the Lower Limestone and Calp series.

Section 3, from the lower Silurian strata at Lisbellaw, to the same series of rocks near Scot's House in Monaghan, showing the order of succession of the Carboniferous system, from the Yellow Sandstone base at either extremity to the Calp and Calp Sandstone of the Slievebeagh district.

Section 4, from the Culm beds near Lochillin, the Munster Coal district, to Shannon Grove, near Pallaskenry, in the county of Limerick, showing the relative positions of the several members of the Carboniferous system in the south of Ireland.

Vide page 135.

PLATE VIII.

ILLUSTRATIVE OF A PAPER, BY GEORGE C. HYNDMAN, ON A DISTORTED SPECIMEN OF FUSUS ANTIQUUS.

Fig. 1. *Fusus antiquus*, front view.
,, 2. ,, side view.

Vide page 250.

PLATE IX.

ILLUSTRATIVE OF A PAPER, BY J. R. KINAHAN, M. B., ON DUBLIN CRUSTACEA.

Fig.

1. *Xantho rivulosa* (*Kroyer*).
2. *Hippolyte pusiola* (*Kroyer*). Spines over eye omitted in figure.
2A. One of the second pair of legs of ditto.
2B. Carapace.
2C. Termination of median plate of tail.
3. *Portunus carcinoides, jun.* (*Kinahan*), size of life.
3A. Carapace of ditto.
3B. Terminal joints of fifth pair of legs, enlarged.
3C. Hand, terminating in two well-marked carinæ on the upper sides, the inner terminating in a very minute outward tubercle; enlarged.
4. Zoe of *Pirimela denticulata*, taken from life.
5. Ditto, ditto, from dead specimen; spines over eye omitted in figure.
6. Back view of termination of abdomen, enlarged.

Vide pages 62, 80, 153.

PLATE X.

ILLUSTRATIVE OF A PAPER, BY J. R. KINAHAN, M.B., ON DUBLIN CRUSTACEA.

Fig.

1. *Hippolyte varians*, normal type ; rostrum nearly straight; apex bidentate, directed upwards, upper tooth shortest; below, two teeth, the anterior much posterior to the upper tooth of apex; proportional frequency of occurrence, 63 per cent.

1A. Peduncle of external antennæ of ditto.

1B. Median plate of tail of ditto.

2. Rostrum straight; apex tridentate, teeth directed forwards, upper and lower teeth nearly equal in length; below, one tooth only; proportional frequency, 25 per cent.

3. Rostrum strongly curved upwards, scimitar-shaped; apex tridentate; upper tooth slightly longer than lower; below, a single tooth; proportion, 8 per cent. N. B. The whole animal is much slenderer than the normal type: query, a *species*.

4. Rostrum straight; apex broadly truncated, directed forwards, quadridentate; in plate wrongly represented as tridentate; apical teeth very minute; below, two teeth; proportion, 2 per cent.

6. Rostrum straight; apex acuminate, *simple;* in plate wrongly represented as bidentate; directed upwards; rostrum with two teeth below. One specimen out of 300 examined.

5. Rostrum straight; apex bifid; rostrum with *three* teeth below, viz., one beneath apex, and two closely approximated in the broadest portion of the rostrum. One specimen.

7, 8. Rostrum of *H. Cranchii*. In Fig. 8, the two lateral spines omitted.

9, 10. Ditto, *H. pusiola* (*Kroyer*). Tooth over eye omitted in Plate.

11, 12, 13, 14. Rostrum of varieties of *Palæmon squillæ*.

Vide page 160.

EXPLANATION OF PLATE X.

Fig.

1. Labolips innupta fem. The crossed lines beneath show the natural length of the body, and the spread of the wings.
2. Head, from above.
3. Same, from beneath.
4. Same, from the side.
5. Epistoma, with Labrum.
6. Mandible, from within.
7. Peristoma, basal piece, with Labium (a), and Maxillæ (b).
8. Labial palpus.
9. Antenna.
10. Upper and under wing.
11. Hamuli of under wing.
12. Fore tibia, with Spur and Metatarsus.
13. Last external segment of abdomen, with Ovipositor and its Fulcra, in position.
14. Tips of valves of Vagina.
15. Tip of tube, formed by the Ovipositor and its vagina, seen in the direction of its axis.
16. Calamus, between the valves of Vagina parted.
17. Spiculum, with its Fulcrum.
18. Intestinal canal, including Œsophagus (a), Rectum (r), and Malpighian vessels (m).
19. Ovaries, with the separate Oviducts, and the common Excretory canal.
20. Egg, or Germinal vesicle, extracted.

PLATE X.*

ILLUSTRATIVE OF A PAPER, BY A. H. HALIDAY, A.M., F.L.S., ON A NEW GENUS AND SPECIES OF THE FAMILY DIAPRIDÆ.

Fig.

1. Labolips innupta fem. The crossed lines beneath show the natural length of the body, and the spread of the wings.
2. Head, from above.
3. Same, from beneath.
4. Same, from the side.
5. Epistoma, with Labrum.
6. Mandible, from within.
7. Peristoma, basal piece, with Labium (a), and Maxillæ (b).
8. Labial palpus.
9. Antenna.
10. Upper and under wing.
11. Hamuli of under wing.
12. Fore tibia, with Spur and Metatarsus.
13. Last external segment of abdomen, with Ovipositor and its Fulcra, in position.
14. Tips of valves of Vagina.
15. Tip of tube, formed by the Ovipositor and its vagina, seen in the direction of its axis.
16. Calamus, between the valves of Vagina parted.
17. Spiculum, with its Fulcrum.
18. Intestinal canal, including Œsophagus (a), Rectum (r), and Malpighian vessels (m).
19. Ovaries with the separate Oviducts, and the common Excretory canal.
20. Egg, or Germinal vesicle, extracted.

Vide page 166.

PLATE XI.

ILLUSTRATIVE OF A PAPER, BY A. H. HALIDAY, A.M., F.L.S., ON SOME REMAINING BLANKS IN THE NATURAL HISTORY OF THE NATIVE DIPTERA.

Fig.

1. OXYCERA MORRISII (?) Larva, from above.
2. Head, from above.
3. Dorsal bristle, and group of Vesicles.
4. Last two segments from beneath, showing the hooks of the penultimate segment.

5. NEMOTELUS ULIGINOSUS Pupa case, from above.
6. Larva of same, from above.
7. Two intermediate segments, from beneath.
8. Last segment, from above.
9. Same, from beneath.
10. Posterior Respiratory cleft.
11. Head and Prothorax, from the side.
12. Prothoracic spiracle, from the inside.
13. Lateral spiracle of abdomen, in position.
14. Head, from above.
15. Antenna.
16. Terminal joint, and bristle of same.
17. Epistoma from the side with spiny Labrum.
18. Mandible. 19. Maxillæ. 20. Labium (* the base or insertion).
21. Black elliptic plate, and root of bristle, in position.
22. Intestinal Canal, in position. 23. Same, unrolled; including Mouth (a), Crop (c), Colon (o), Anal segment (z), Malpighian vessels (m), and their Common duct (n).

24. ANTHOMYIA RIPARIA. Pupa case, from above.
25. Same from the side.
26. Reticulations of case.
27. Larva of same, from the side, extended.
28. Head and Prothorax, from the side.
29. Posterior end, from above.
30. Same, from beneath.
31. Dorsal horn, showing the muricated base, and the position of the Spiracle at the tip.
32. Tip of a Ventral horn, or False leg.
33. Anal tubercle.
34. Muricated lateral edge of a posterior ventral incisure.

Vide page 177.

EXPLANATION OF PLATE XI.

Fig.

1. Oxycera morrisii (?) Larva, from above.
2. Head, from above.
3. Dorsal bristle, and group of Vesicles.
4. Last two segments from beneath, showing the hooks of the penultimate segment.
5. Nemotelus uliginosus Pupa case, from above.
6. Larva of same, from above.
7. Two intermediate segments, from beneath.
8. Last segment, from above.
9. Same, from beneath.
10. Posterior Respiratory cleft.
11. Head and Prothorax, from the side.
12. Prothoracic spiracle, from the inside.
13. Lateral spiracle of abdomen, in position.
14. Head, from above.
15. Antenna.
16. Terminal joint, and bristle of same.
17. Epistoma from the side, with spiny Labrum.
18. Mandible. 19. Maxilla. 20. Labium (* the base or insertion).
21. Black elliptic plate, and root of bristle, in position.
22. Intestinal Canal, in position. 23. Same, unrolled; including Mouth (a), Crop (c), Colon (o), Anal segment (z), Malpighian vessels (m), and their Common duct (n).
24. Anthomyia riparia. Pupa case, from above.
25. Same, from the side.
26. Reticulations of case.
27. Larva of same, from the side, extended.
28. Head and Prothorax, from the side.
29. Posterior end, from above.
30. Same, from beneath.
31. Dorsal horn, showing the muricated base, and the position of the Spiracle at the tip.
32. Tip of a Ventral horn, or False leg.
33. Anal tubercle.
34. Muricated lateral edge of a posterior ventral incisure.

PLATE XII.

ILLUSTRATIVE OF A PAPER, BY W. H. HARVEY, M.D., F.L.S., ON NEW BRITISH ALGÆ.

Fig.

1A. *Leathesia crispa*, growing on *Chondrus crispus*, the natural size.
2A. Part of a filament, with its curled apical ramelli, magnified.
3A. Ramellus and spore, more highly magnified.
1B. *Elachista Grevillii* growing on *Cladophora rupestris*, the natural size.
2B. Portion of the tuft magnified.
3B. Apex and base of a filament more highly magnified.

Vide page 201.

PLATE XIII.

ALSO ILLUSTRATIVE OF DR. HARVEY'S PAPER.

Fig.

1A. Magnified view of a portion of the crust of *Actinococcus Hennedyi.*
2A. Fertile and barren filaments separated.
3A. A tetraspore.
1B. Part of the crust of *Cruoria pellita,* magnified.
2B. Portion of a filament.
3B. A tetraspore.
1C. *Cruoria* —— (?).
1C. Some of the threads as they lie in the stratum.
2C. Some separated, with a spore more highly magnified.

Vide page 201.

PLATE XIV.

ILLUSTRATIVE OF A PAPER, BY JOSEPH R. GREEN, ON ACALAPHÆ OF DUBLIN COAST.

Fig.

1A. *Stomobrachium octo-costatum*, magnified.
1B. Ditto, seen from above.
1C. Ovary of ditto.
1D. Portion of marginal canal.
2A. *Equorea formosa*, magnified.
2B. Ditto, seen from above.
3A. *Thaumantias Pattersonii*, magnified.
3B. Ditto, seen from beneath.
3D. Portion of marginal canal.
3C. One of the ovaries, showing leeches parasitic on ditto.
3E. One of the leeches, magnified.
4A. *Thaumantias neglecta*, magnified.
4B. Ditto, seen from beneath.
4C. Ovary of ditto.
4D. A single tentacle, magnified.

Vide page 242.

PLATE XV.

ILLUSTRATIVE OF A PAPER, BY JOSEPH R. GREEN, ON ACALAPHÆ OF DUBLIN COAST.

Fig.

5A. *Thaumantias typica*, natural size of large specimen.
5B. Ditto, seen from beneath.
5C. Peduncle of ditto,
6A. *Bougainvillea dinema*, magnified.
6B. Ditto, seen from above.
6C. One of the compound tentacular bulbs, magnified.
6D. Peduncle of ditto.
6E. Ditto, seen from above.
6F. One of the tentacular lips, magnified.
7A. *Diplonema islandica*, magnified.
7B. Tentacles of ditto, showing gemmules sprouting therefrom.
8A. *Steenstrupia Owenii*, magnified.
8B. Peduncle of ditto.
8C. A portion of the tentacle, highly magnified.

Vide page 242.

PLATE XVI.

PARTLY ILLUSTRATIVE OF A PAPER BY W. SPENCE BATE, F.L.S., ON IPHIMEDEA EBLANÆ; AND PARTLY OF A PAPER BY J. R. KINAHAN, M.B., ON GALATHEA ANDREWSII.

Fig.

1. *Iphimedea Eblanæ* (*Spence Bate*). Lateral view.
2. Ditto, Dorsal view.
3. Mandible.
4. Maxilliped.
5 & 5A. First gnathopod.
6. Second gnathopod.
7. Telson.
8. *Galathea Andrewsii* (*Kinahan*), twice the natural size.
8A. Chela of ditto.
8B. Thumb of chela.
8C. External maxilliped.
8D. Rostrum.

Vide page 229.

PLATE XVII.

ILLUSTRATIVE OF A PAPER, BY R. Q. COUCH, M.R.C.S. ENG., ETC., ON THE EMBRYO FORM OF PALINURUS VULGARIS.

Fig.

1. Embryo form, just escaped from egg. Front view.
2. Ditto, ditto. Outline of side view.
3. Eye of ditto.
4. Termination of limb of ditto.

Vide page 228.

PLATE XVIII.

ILLUSTRATIVE OF A PAPER, BY E. PERCIVAL WRIGHT, A. B., M. R. I. A., ON THE DISCOVERY OF LIPURA STILLICIDII IN IRELAND.

Fig.

1. *Lipura stillicidii*, from a specimen taken in the Mitchelstown Caves, county of Cork.
2. Head of ditto.
3. Antenna of ditto.
4. Claw of foot.
5. Foot.
6. Thoracic segments.

2A. *L. stillicidii.* Copy of Schiödte's figure.
2B. Young state of ditto.
2C. Larva of ditto.
2D. Ocelli of ditto.

Vide page 231.

PLATE XIX.

ILLUSTRATIVE OF A PAPER BY J. R. KINAHAN, M. B.—ANALYSIS OF GENERA OF TERRESTRIAL ISOPODA, RECORDS OF BRITISH SPECIES, AND DESCRIPTIONS OF NEW GENUS AND SPECIES.

Fig.

1. *Porcellio cingendus*, much enlarged. Tail appendages as in Fig. 4.
2. Head and first cephalo-thoracic ring of *P. cingendus*.
3. Ditto, ditto, *P. pruinosus*.
4. Fifth and sixth abdominal rings of *P. cingendus*.
5. Ditto, ditto, *P. pruinosus*.
6. Back view of head of *P. cingendus*.
7. Ditto, *P. pruinosus*.
8. Abdominal false feet of *P. cingendus*. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory filament.
9. Tige of external antenna of *P. cingendus*.
10. Front view of head, and side view of orbit of *Oniscus murarius*. *a*, Line of front. *b*, Lateral lobes. *c*, External antennæ. *d*, Transverse suture.
11. Peduncle of external antennæ of *O. murarius*.
12. Abdominal false feet of *O. murarius*. (References as in Fig. 8.)

Vide page 258.

PLATE XX.

ALSO ILLUSTRATIVE OF DR. KINAHAN'S PAPER.

Fig.

1. *Philoscia muscorum*, much enlarged. The antennæ disproportionately large.
2. Abdominal false feet (♂), last pair. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory appendage.
3. Fifth and sixth abdominal rings. *a*, Abdominal false feet.
4. Back view of head.
5. Front view of head. *a*, External antennæ. *b*, Internal antennæ. *c*, Superior margin, third segment.
6. Internal antennæ.
7. *Ligia oceanica*, false feet. References as in *Philoscia muscorum*.
8. Ultimate abdominal ring of ditto.
9. Side view of orbit of ditto.
10. Front view of orbit of head. *a*, External antennæ. *b*, Eyes. *c*, Superior margin of third ring. *d*, Internal antennæ.
11. Back view of head of *Oniscus murarius*. *e*. Frontal line of head. *c*. lateral lobes.

Vide page 258.

PLATE XXI.

ALSO ILLUSTRATIVE OF DR. KINAHAN'S PAPER.

Fig.

1. External antennæ of *Porcellio pruinosus* (immature). *a*, Tige.
2. External antennæ of *P. scaber* (immature).
3. Antennæ of *Armadillium vulgare*. (A) Internal. (B) External. *b*, Tige.
4. Peduncle and tige of external antennæ of *Philoscia muscorum*.
5. External antennæ of *Oniscus fossor*.
5A. Tige of *O. murarius* (immature).
6. Abdominal false feet of *O. fossor*.
7. Terminal rings of *O. fossor*.
8. Ditto, *Porcellio scaber*.
9. False feet of *Armadillium vulgare*. The numerals are omitted from this figure.
10. Last rings of abdomen of ditto.
11 and 12. Back views of heads of ditto.
13. Front views of ditto. Incorrectly numbered as 12.
14. External and internal antennæ of *Ligia Porsoni* (after Lereboullet).

Vide page 258.

PLATE XXII.

ALSO ILLUSTRATIVE OF DR. KINAHAN'S PAPER.

Fig.

1. *Philougria celer* (*n. s.*), much magnified.
2. Last pair abdominal false feet, front and back view of ditto. *a*, Peduncle. *b*, Accessory lobe. *c*, Ischium. *f*, Accessory appendage.
3. Terminal abdominal rings.
4. Tige of external antennæ.
5. Abdominal false feet of Tylos, after Dana.
6. Ditto, Actæcia, ditto.
7. Ditto, Scyphax, ditto.
8. Ditto, Sphœrillo, ditto.
9. Ditto, *Ligidium Porsoni* (after Lereboullet).

Vide page 258.

PROCEEDINGS OF SOCIETIES.

CORRIGENDA ET ERRATA.

Page 81, line 9 from bottom, *for* brevie, *read* breve.
„ 81, „ 4 from bottom, *omit* læve et inerme.
„ 82, „ 6 from top, *for* perfectly smooth, *read* spined.
„ 82, lines 11 and 12 from top, *omit from* but *to* species.
„ 83, line 4 in Table, *for* smooth, *read* spined.
„ 83, „ 5 in Table, *for* spined? *read* smooth.
„ 83, „ 24 from bottom, *for* Cranchii? *read* Pusiola.
„ 84, „ 12 from bottom, *insert a comma after* common.
„ 85, middle of page, *dele paragraph commencing* P. Prideauxii.
„ 99, line 8 from top, *for* Plate VI., *read* Plate III.
„ 99, „ 21 from bottom, *for* Plate VII., *read* Plate IV.
„ 151, „ 3 from bottom, *for* Antrim, *read* Arran.
„ 156, „ 6 from bottom, *for* curvature, *read* armature.
„ 160, „ 16 from bottom, *insert a comma after* bidendate.
„ 176, „ 12 from top, *for* vol. x., *read* vol. iv.
„ 173, „ 17 from bottom, *for* Plate X., *read* Plate X.*
„ 162, „ 4 from top, *after* smooth *insert a semicolon, and dele it after* specimens.

Fig 1.

Fig 2.

Fig 3.

Fig 4.

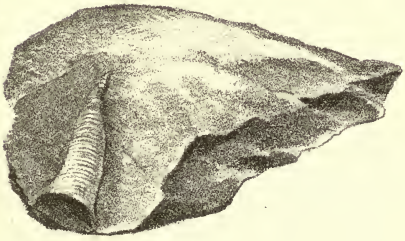
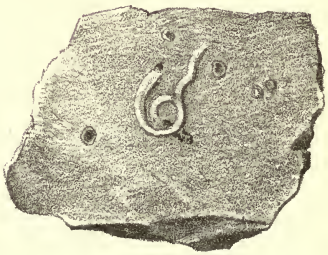


Fig 5.



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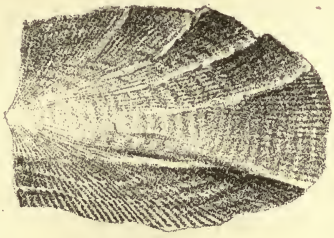

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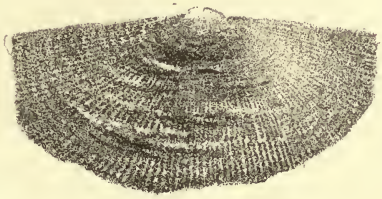

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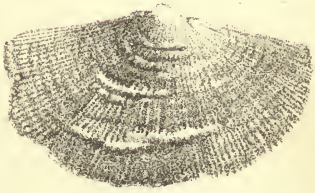

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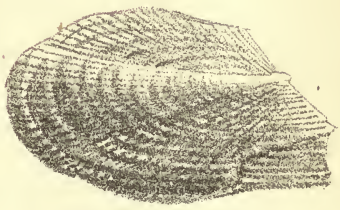

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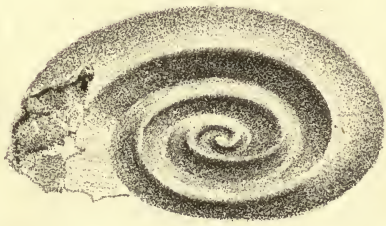

2 C

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3

4

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Fig 1.

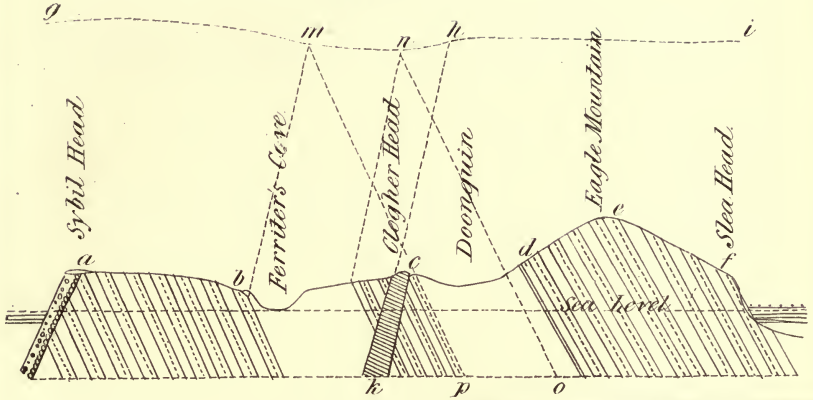

Fig 2.

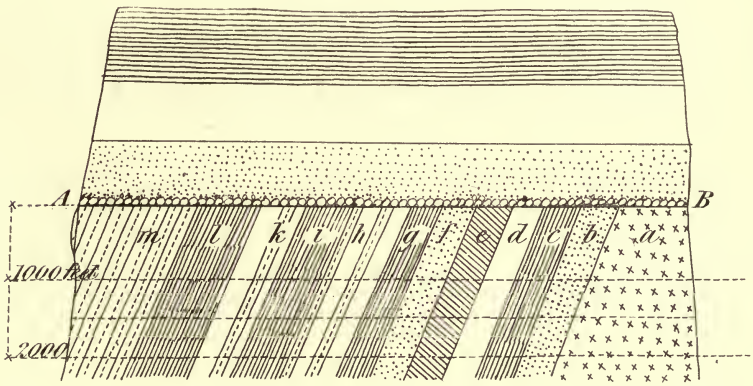

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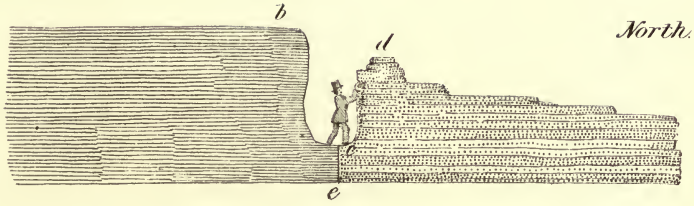
Fig 1



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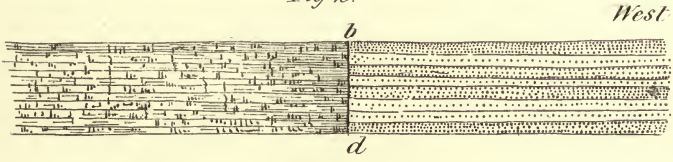
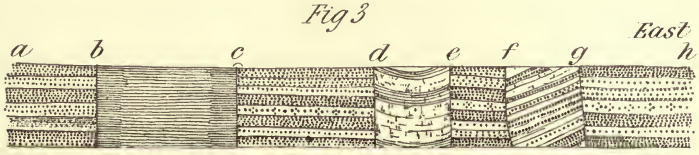


Fig 3



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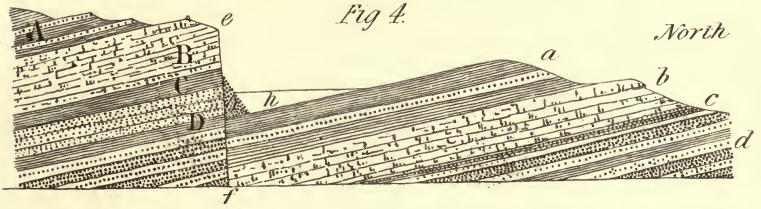

Fig 5.

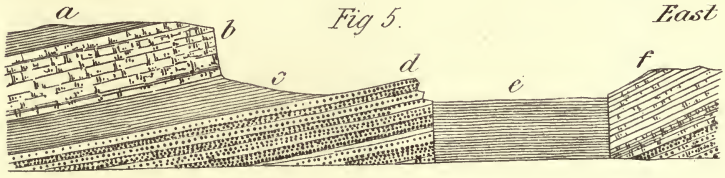

Fig 6.

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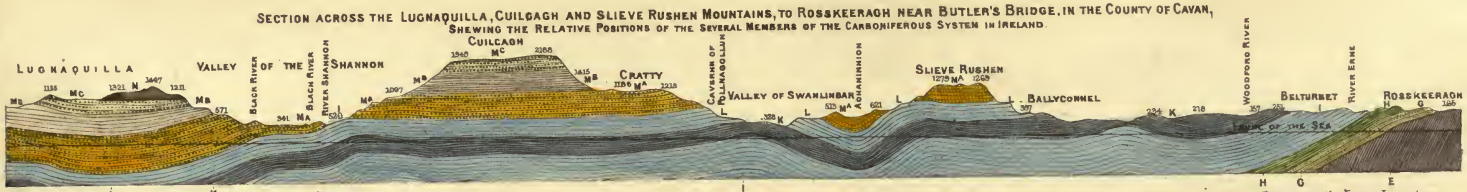
SECTION ACROSS THE LUGNAQUILLA, CUILCAGH AND SLIEVE RUSHEN MOUNTAINS, TO ROSSKEERAGH NEAR BUTLER'S BRIDGE, IN THE COUNTY OF CAVAN,

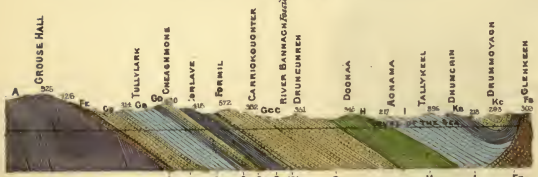
SHEWING THE RELATIVE POSITIONS OF THE SEVERAL MEMBERS OF THE CARBONIFEROUS SYSTEM IN IRELAND.



N. Coal / M. Millstone Grit, divided into Mc Upper Sandstone Ms. Shale, Ma. Lower Sandstone L. Upper or Splintery Limestone, K. Calp or Middle Limestone, (beds of dark gray Shale, and impure limestone,) l. Lower Limestone.
H. Carboniferous Slate or Lower Limestone Shale. G. Yellow Sandstone E. Silurian strata.

SECTION THROUGH THE YELLOW SANDSTONE DISTRICT NORTH OF LOUGH ERNE.

EXHIBITING A COMPLETE SEQUENCE OF THE SEVERAL MEMBERS OF THAT GROUP OF ROCKS, SUCCEEDED CONFORMABLY BY THE LOWER LIMESTONE AND CALP SERIES.



Kc. Calp Sandstone Kb. Calp or Middle Limestone, (beds of dark gray shale and impure limestone,) l. Lower Limestone H. Carboniferous Slate or Lower Limestone Shale. Ccc. Yellow Sandstone and Shale, with a thin bed (a) of impure coal. Gc. Arenaceous Shale Gb. Arenaceous Limestone Gd. Yellow Sandstone. Fe. Old Red conglomerate Fe. Old Red conglomerate? Silurian Strata. A. Mica Schist.

SECTION FROM THE LOWER SILURIAN STRATA AT LISBELLAW, TO THE SAME SERIES OF ROCKS NEAR SCOT'S HOUSE IN MONAGHAN,

SHEWING THE ORDER OF SUCCESSION OF THE CARBONIFEROUS SYSTEM, FROM THE YELLOW SANDSTONE BASE AT EITHER EXTREMITY, TO THE CALP AND CALP SANDSTONE OF THE SLIEVEBEAGH DISTRICT.

Kc. Calp Sandstone. Kb. Calp or Middle Limestone, (beds of dark gray shale and impure limestone,) l. Lower Limestone. H. Carboniferous Slate or Lower Limestone Shale. G. Yellow Sandstone. Fa. Old Red Conglomerate? Silurian strata. Eb. Fossiferous Silurian Rocks. Ea. Silurian Slate.

SECTION FROM THE CULM BEDS NEAR LOCHILLIN THE MUNSTER COAL DISTRICT, TO SHANNON GROVE NEAR PALLASKENRY, IN THE COUNTY OF LIMERICK,

SHEWING THE RELATIVE POSITIONS OF THE SEVERAL MEMBERS, OF THE CARBONIFEROUS SYSTEM IN THE SOUTH OF IRELAND.

N. Coal (anthracite) l. Upper or splintery Limestone. K. Calp or Middle Limestone, (beds of dark gray shale and impure limestone,) l. Lower Limestone. H. Carboniferous Slate or Lower Limestone Shale. G. Yellow Sandstone.
F. Old Red Sandstone, shale and conglomerate.

— HORIZONTAL SCALE FOUR MILES TO AN INCH. —

— VERTICAL SCALE ONE MILE TO AN INCH. —

NATHST. REVIEW.

July 1837

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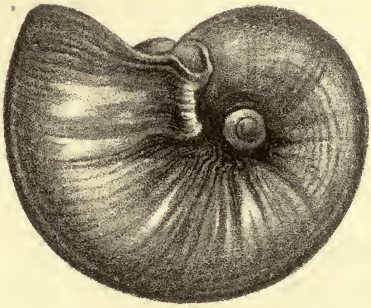
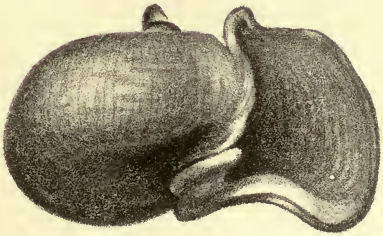
NATURAL HISTORY.





NATURAL HISTORY.

Fig 5. 50/1

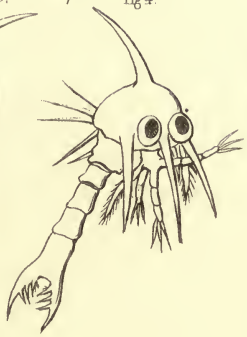


Fig 4.

Fig 6. 350/1

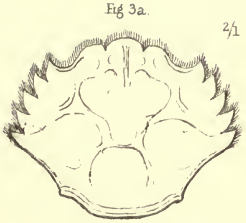


Fig 3a.
2/1

Fig 3b.
4/1

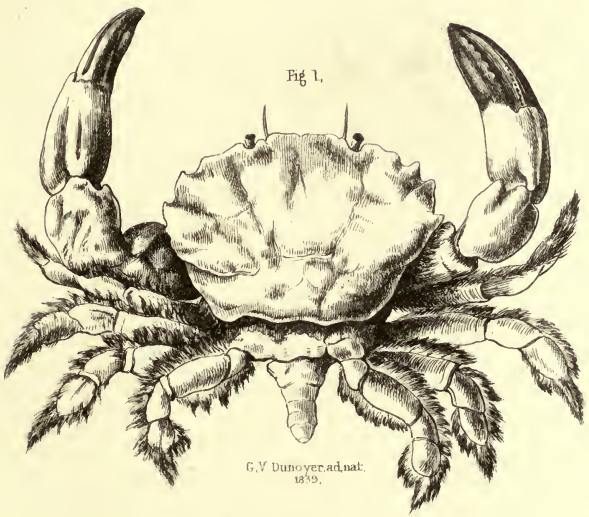


Fig 1.
G.V. Dunoyer ad.nat.
1859.

Fig 3c.
4/1

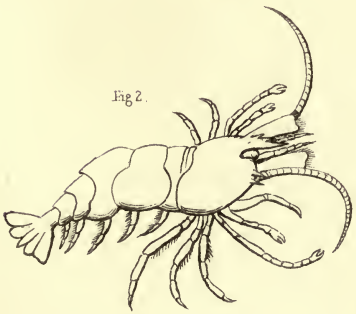


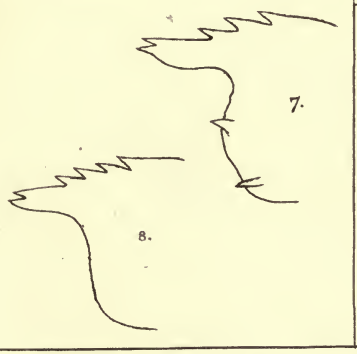
Fig 2.

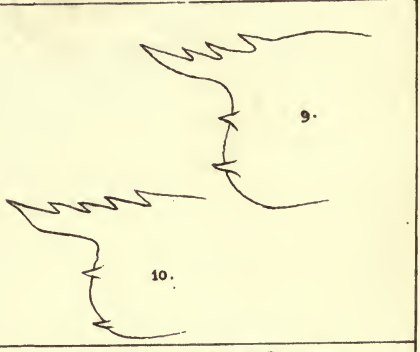
Fig 2a.

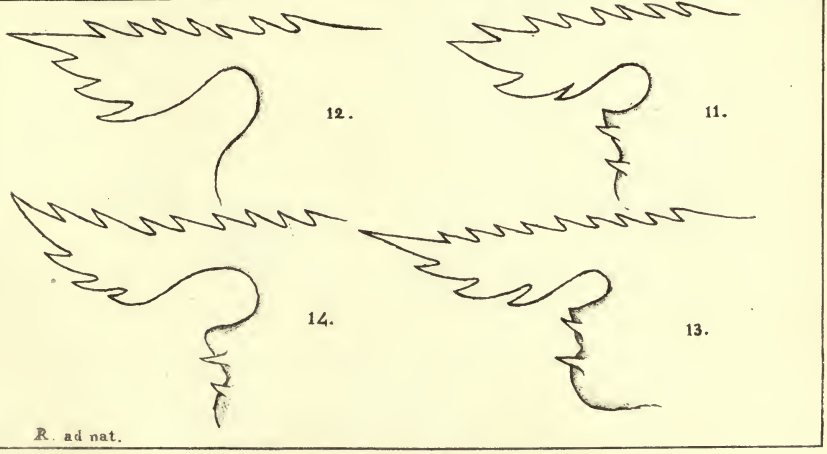
Fig 2b.

Fig 2c.

Fig 3.







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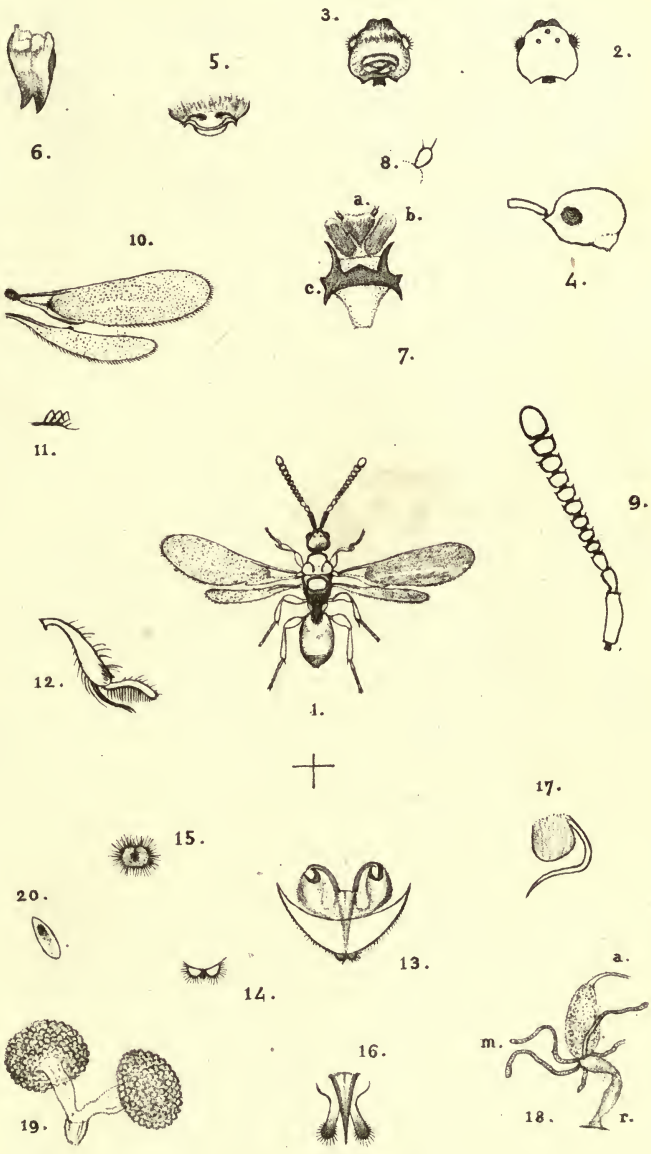

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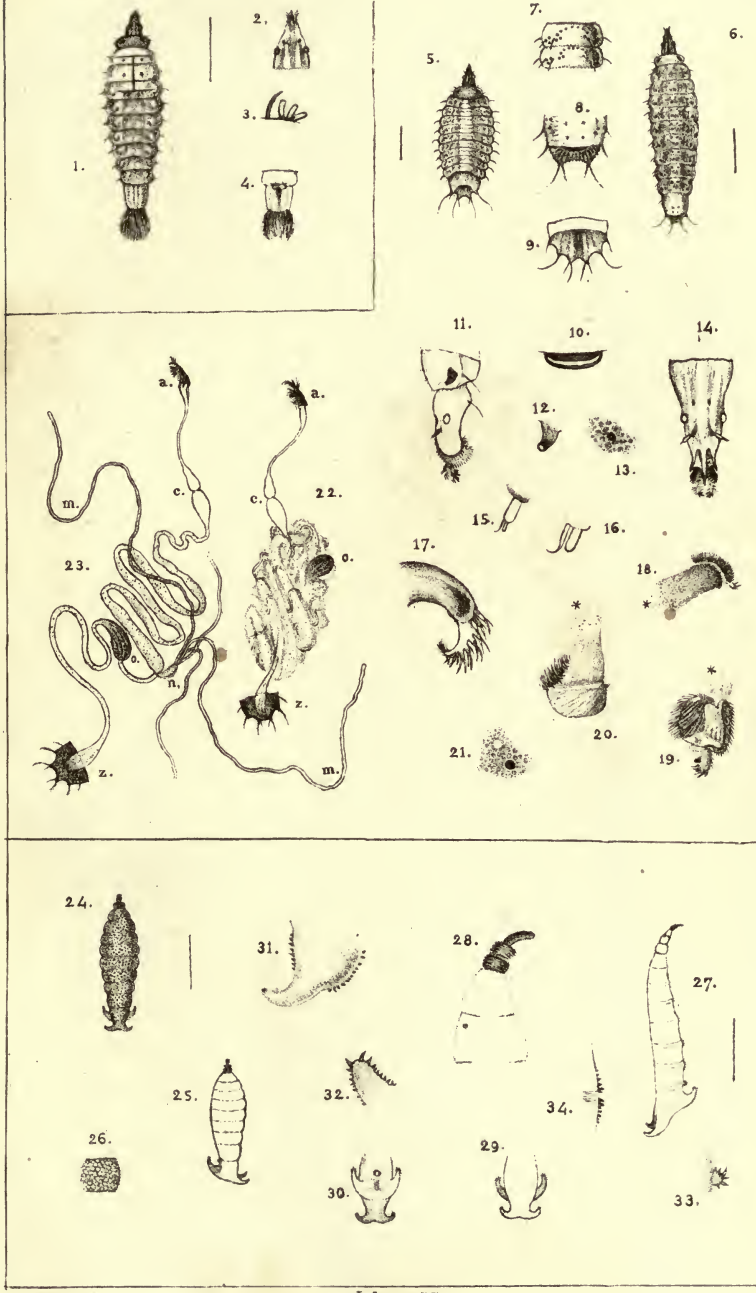
BRITISH MUSEUM
NATURAL HISTORY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NAT. HISTORY.

A

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W.H.H. ad. nat. Hirster & Co. Dublin.

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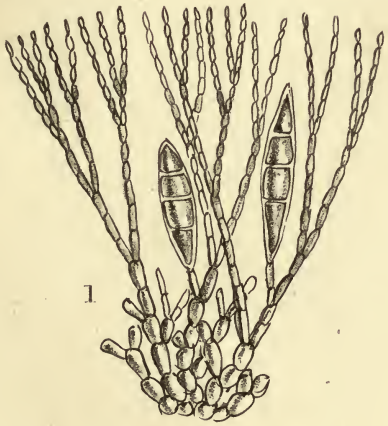
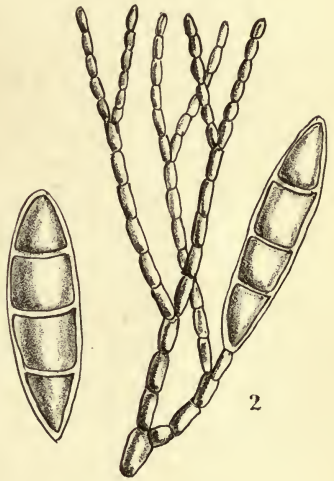
NATURAL HISTORY.

A

B.





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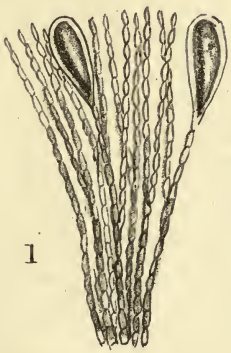

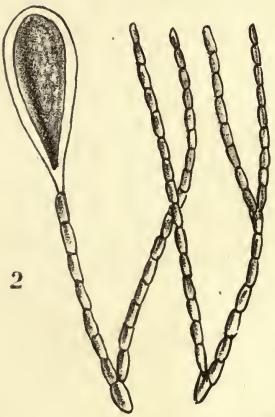

BRITISH
HISTORY

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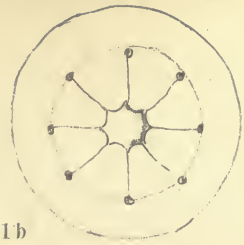

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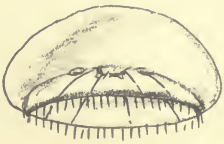

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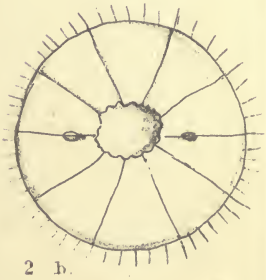

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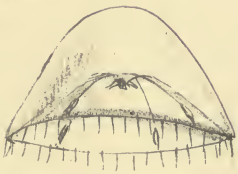

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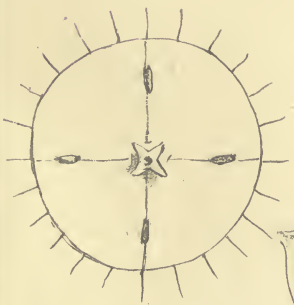

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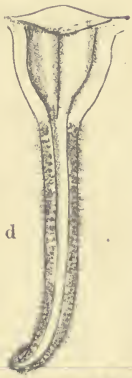

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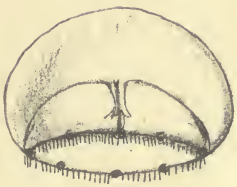

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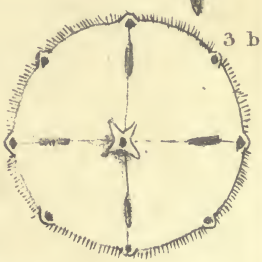

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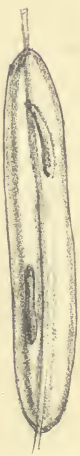

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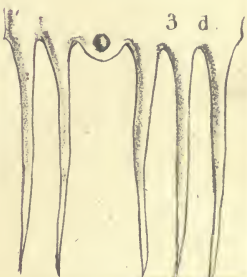

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J. R. G. ad. nat.

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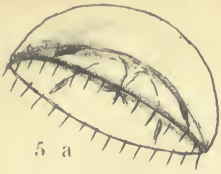
NAT. HISTORY.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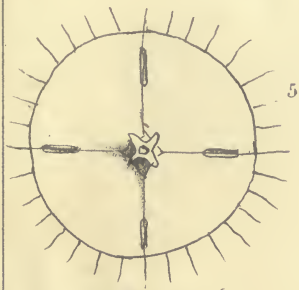
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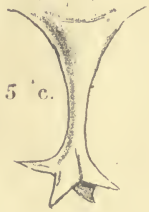
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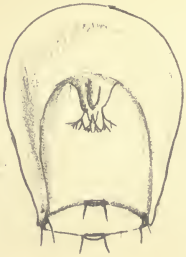
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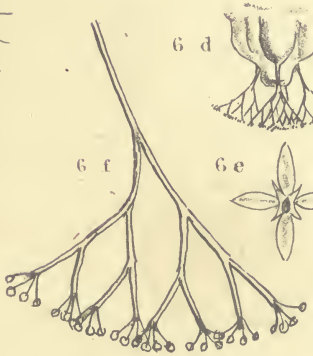
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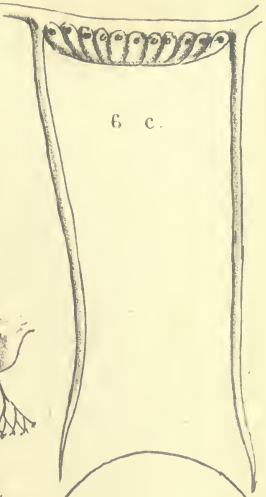
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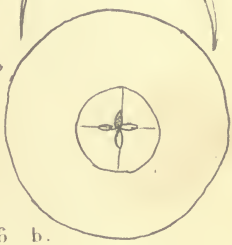
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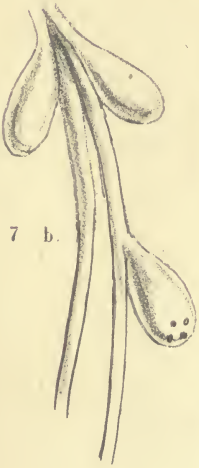
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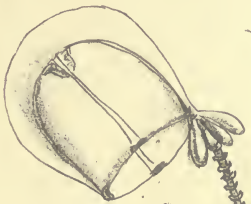
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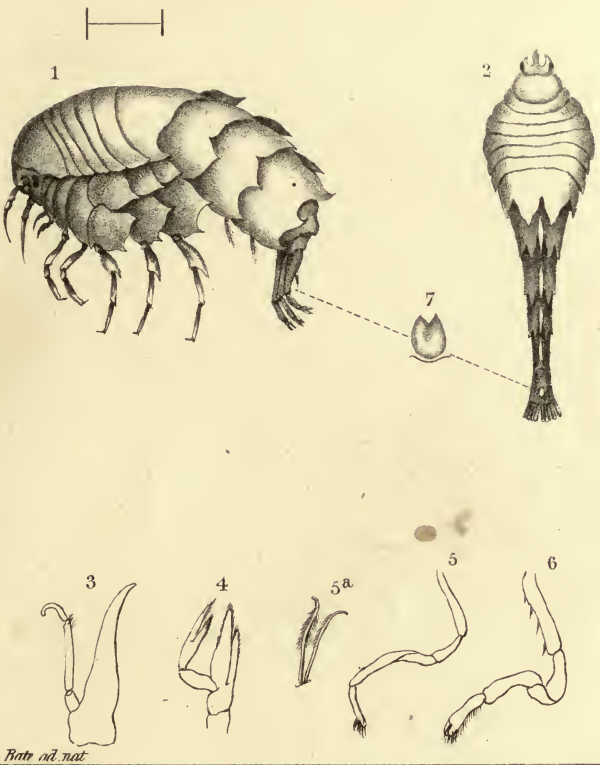
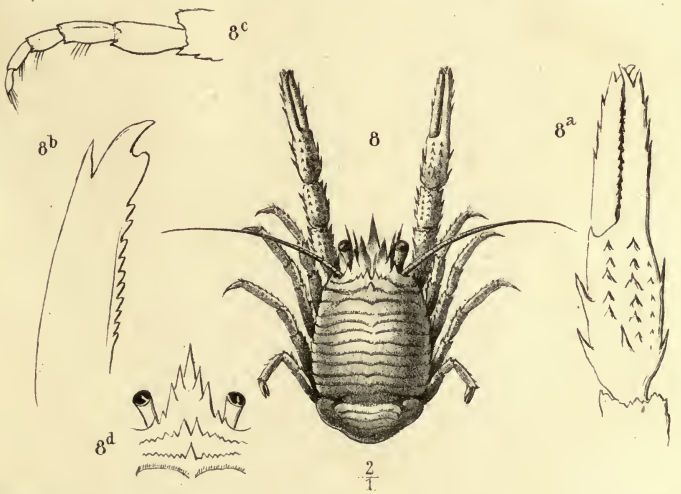
NAT. HISTORY.

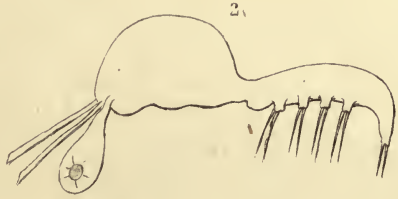


C. Spence Bate ad. nat.



R. ad. nat. Forster & Co. Dublin.

BRITISH
NATURAL HISTORY.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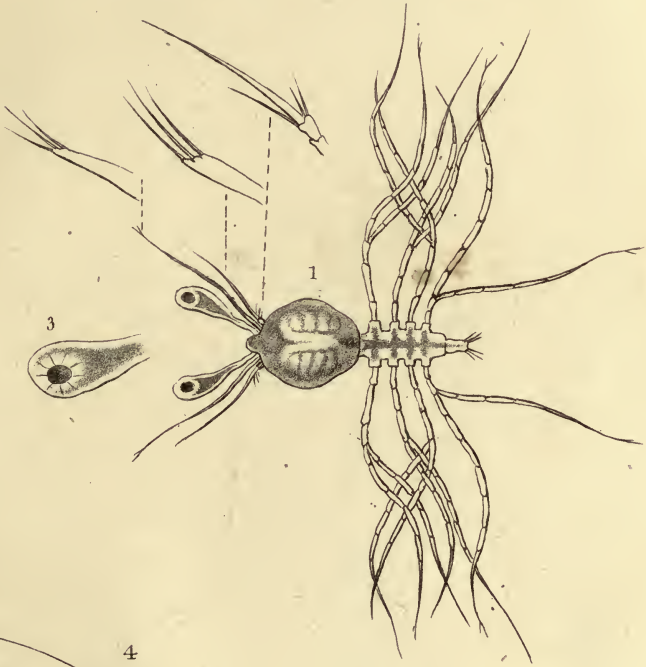
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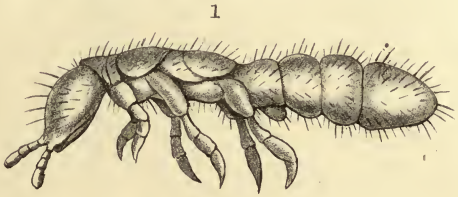
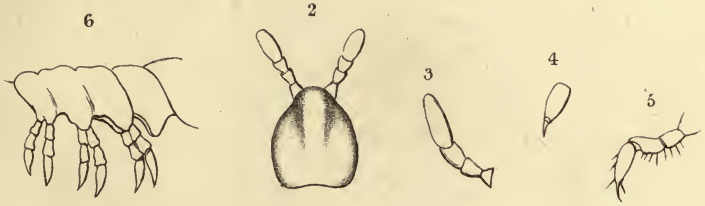
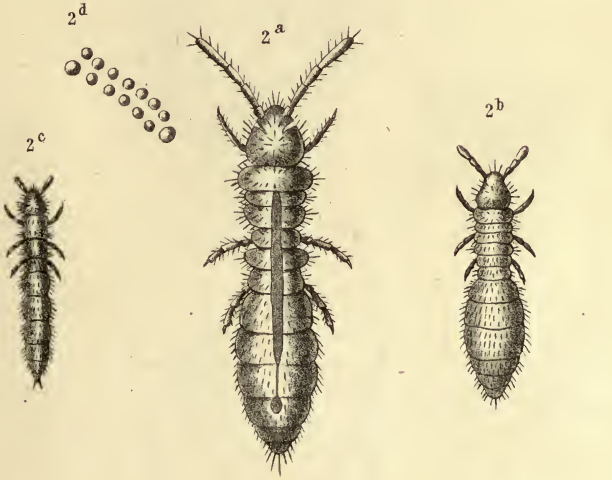
NATURAL HISTORY







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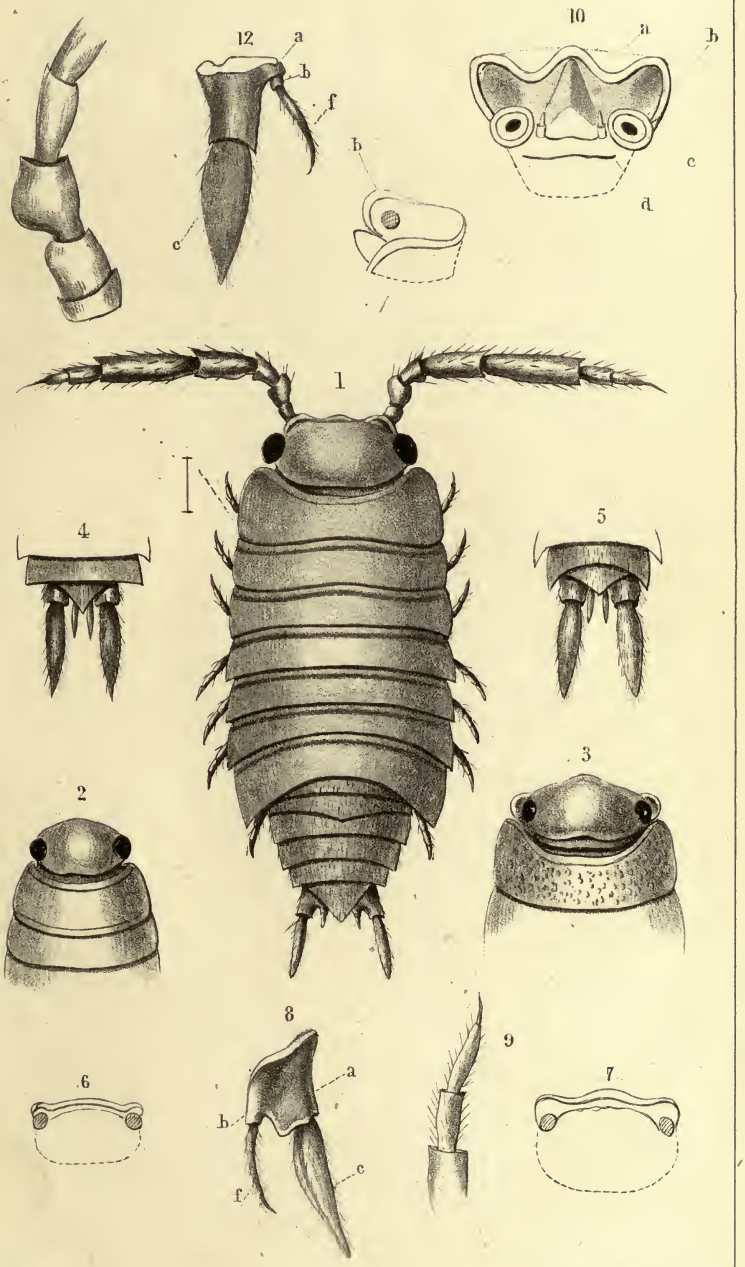
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BRITISH
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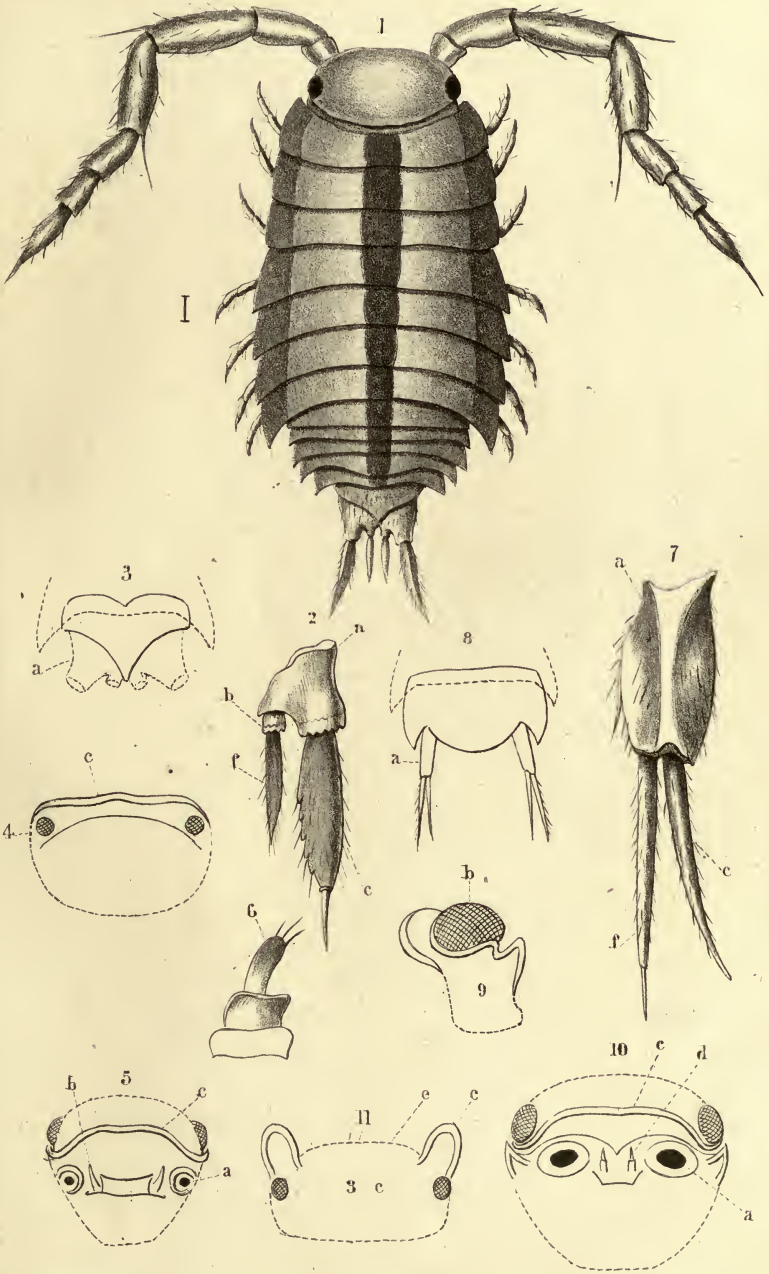
NATURAL HISTORY



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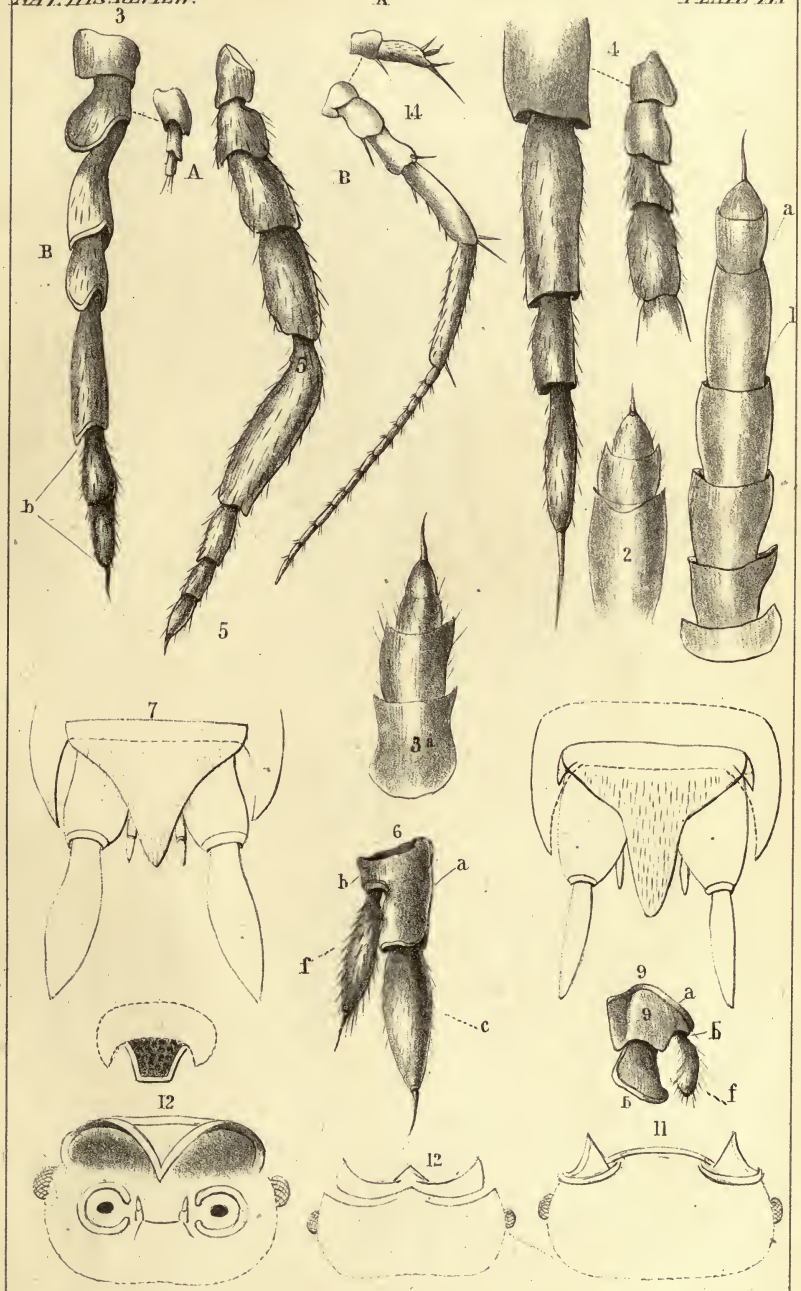

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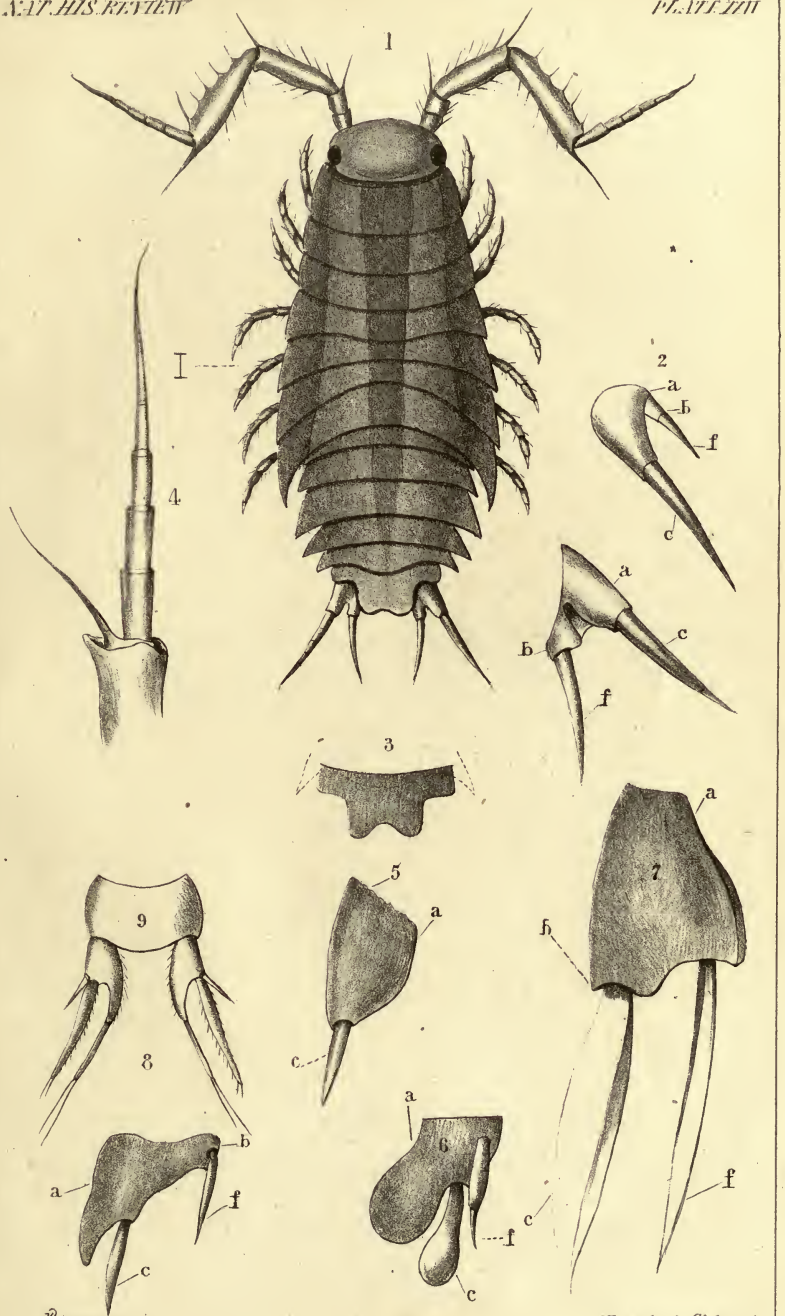

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THE

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(Jones, Joseph, M.D.) Researches, Chemical and Physiological, concerning certain North American Vertebrata; with twenty-seven woodcuts—pp. 150. I. Method employed in analysing the blood. II. Blood of Vertebrate animals in its normal condition. III. Physical and Chemical changes of the solids and fluids of Cold and Warm-blooded Animals, when deprived of Food and Drink. IV. Effects of Starvation and Thirst, combined with a change of Diet, upon the Solids and Fluids of Carnivorous Chelonians. V. Observations upon the Alimentary Canal and Digestion of Albumen and Flesh. VI. Comparative Anatomy and Physiology of the Pancreas. VII. Observations upon the Liver. VIII. Observations upon the Spleen. IX. Observations upon the Kidneys. X. Urine of Cold-blooded Animals.

PROCEEDINGS OF THE BOSTON SOCIETY OF NATURAL HISTORY. 8vo. Boston, U.S. Vol. V. Fo. 14-21. 1855, 1856.

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scribed as new. (Lea) Description of a new subgenus of Najades, *Plagiodon*, and of a new species of Triquetra—p. 79. (Same) Description of new fresh-water shells from California—p. 80. Pompholyx effusa, Melania shastaensis, nigrina; Physa triticea; Planorbis traskii; Lymnæa proxima; Ancylus patelloides; *n. spp.* (Same) Descriptions of twenty-five new species of Unio—p. 92-95. PALEONTOLOGY. (Leidy) Extinct Mammalia, discovered by Dr. Hayden in the Mauvaises Terres of Nebraska—p. 59, 88-92. (Same) Remains of a species of Seal, from the Post-Pliocene deposit of the Ottawa river, Canada; with a plate—p. 90. (Same) Notices of extinct Reptilia and fishes discovered by Dr. Hayden in the Mauvaises Terres of the Judith river, Nebraska territory—p. 72. (Same) Description of two Ichthyodorulites—p. 11. (Lea) Tooth of a Sauroid reptile, *Centemodon sulcatus*, from the shale of the new red sandstone of Pennsylvania—p. 77. (Newberry) Description of several new genera and species of Fossil Fishes, from the carboniferous strata of Ohio—p. 96-100. The names of the new genera are, *Mecolepis* and *Compsacanthus*. (Meek and Hayden) Descriptions of new species of Gastropoda from the cretaceous formation of Nebraska territory—p. 63-69. (Same) New species of Gastropoda and Cephalopoda, from the same—p. 70 72. (Same) Twenty-eight new species of Acephala and one Gastropod, from the same—p. 81-87. (Shumard and Yandell) *Eleutherocrinus*, new fossil genus of the family Blastoidea, from the Devonian strata, near Louisville, Kentucky; with a plate—p. 73-75.

THE AMERICAN JOURNAL OF SCIENCE AND ARTS. Conducted by Professors Silliman and Dana. Second Series. 8vo. New York.
Vol. XXII.; with three Plates and a Map. July-November, 1856.

ZOOLOGY. (Valenciennes and Frémy) On the Composition of the Muscles in the Animal series: from the Journal de Pharmacie, A.D. 1855—p. 9-13. (Dana) Review of the Classification of Crustacea, with reference to certain principles of classification—p. 14-30. We extract from Wiegmann's Archives a critical opinion, by Gerstaecker, upon the systematic views which Dana has put forth in this essay:—"The fashion of artificial systems, long since abandoned in Europe, seems still to have many adherents in America; and, accordingly, the Dichotomous classification in particular, based on single characters, is applied to the Crustacea throughout the present work. Dana proposes to divide the class into Podophthalma, Edriophthalma, and Cirrhipedia: the second of these groups should have embraced all the members of the class which have *not* the eyes petiolated; but the author has felt himself obliged to separate the Cirrhipedia from the rest on account of the discrepancy of their Habitus in their final state of development. He would have carried out the principles of the artificial classification more consistently by retaining them among the Edriophthalma; and this group, in his acceptation, already comprises such heterogeneous elements that the addition of the Cirrhipedia need not have seemed to present a greater difficulty. To us it is plain that the conjunction of the Entomostraca with the Isopoda and Amphipoda in a group equivalent to the Decapoda is inadmissible; since the latter two, notwithstanding their sessile eyes, might be combined in one great group with the Decapoda, more naturally than with the Entomostraca. Further, the author includes the *Rotifera* among the Edriophthalma, without giving any reasons in detail for this very questionable position of them; and again the *Pycnogonida* are combined with the Poecilopoda in the section *Cormostomata* of the Entomostraca, to which the *Gnathostomata* (Phyllopoda and Lophyropoda) and the *Merosomata* (Limulidæ) are opposed as co-ordinate. Many such anomalies, which the exigencies of the Dichotomous arrangement may account for, but do not justify, occur in this classification of Dana's. He has proposed many genera and species among which we might find ample scope for criticism. The most natural genera are often broken up into many, the characters of which are no better than specific differences; as for example the genus Pagurus, of which Milne-Edwards has rightly admitted only subordinate groups, according to the position of the large claw, as that the right or left hand; the numerous transi-

tions in this respect plainly showing the impropriety of deriving generic distinctions from this consideration, as Dana here has done, &c. (Eights) Description of an Isopod Crustacean, *Glyptonotus antarctica*, from the Antarctic seas; with two plates—p. 391-394. Extracted from the Transactions of the Albany Institute. Dana remarks on this that the n.g. is perhaps not sufficiently distinct from *Idotea;* but the species is remarkable as the largest known Isopod, being 3½ inches in length. (Bailey) Microscopic forms found in the soundings of the Sea of Kamschatka; with a plate—p. 1-6. Chiefly Diatomaceæ, but a considerable number of Infusoria and Zoolitharia. Many new species, especially of Polycystineæ, are here described. *Cadium* new genus of Rhizopoda. BOTANY. (Gladstone) Influence of Solar radiation on the Vital powers of Plants growing under different atmospheric conditions—p. 49-66. Extracted from the Report of the Twenty-fourth Meeting of British Association, A.D. 1854. (Johnston) Examination of Panache and Pine sugars from California—p. 6-8. (Gray) Statistics of the Flora of the Northern United States—p. 204-232. In an Appendix some conclusions are drawn as to the comparative Geographical distribution of the species included in the Flora of the Northern States. Of the Phaenogamous section about fifteen per cent. are common to them with Europe, unequally divided between the Monocotyledones, of which nearly one-fourth, and of the Dicotyledones, of which not an eighth, enter into this category; while of the Cryptogama not much less than two-thirds are common to both regions; "in accordance with the general fact that the lower the class the wider the geographical area occupied by the species." PALEONTOLOGY. (Redfield) Relation of the Fossil Fishes of the Sandstone of Connecticut, and other Atlantic States, to the Liassic and Oolitic periods—p. 357-363. (Hitchcock) A new Fossil Shell, *Sphaerulites?* in the Connecticut River Sandstone—p. 239. (Stafford) On the g. *Tetradium*, and the species found in Middle Tenessee—p. 236-238. (Emmons) New Fossil corals from N. Carolina—p. 389-390. GEOLOGY, MINERALOGY, &c. (Dana) Geological History of America—p. 306-334. (Same) On the plan of development in the Geological History of N. America; with a map —p. 335-349. (Same) Supplement, third, to his Mineralogy—p. 246-263. (Blake) Review of Marcou's Geological map of the United States and British Provinces of N. America—p. 383-388. (Murchison) Letter on the Museum of Practical Geology of Great Britain—p. 232-236. (Whitney) Occurrence of ores of Iron in the Azoic system—p. 38-48. (Shephard) New Mineral species, five—p. 96 98. (Mallet) On a Zoolitic mineral, allied to Stilbite, from the Isle of Skye, Scotland—p. 179. (Hitchcock) Description of a large Boulder in the Drift of Amherst, Mass., with parallel striæ on four sides—p. 397-400. (Taylor) Examination of Meteoric Iron from Xiquipulco, Mexico; Extract, Philad. Acad. Trans.—p. 374-376. MISCELLANEOUS. Reports of Surveys for the route of a Railroad from the Mississippi to the Pacific—p. 67-95. (Emmons) On the New South Shetlands—p. 394-397. (Coan) Eruption of Hawaii; Letter to Dana—p. 240-243. Obituary; Zadok Thompson, Prof. Nat. Hist. in the Vermont University—p. 44-49. INTELLIGENCE—p. 105-178, 270-305, 401-434. (Bentham) On *Arachis hypogœa*—p. 435. Retracting his previous published views as to the sterile flowers of Arachis. Review of Gray's Manual of Botany of Northern U. S.—p. 437. (Agassiz) Remarks on the Garpikes of N. America—p. 440. (Trask) On Earthquakes in California; from Proc. Calif. Acad. Nat. Sc.—p. 110. (Wartz) Examination of the water of the Delaware river—p. 124. Review: Safford's Geological Reconnoissance of Tenessee—p. 129. (Rogers) Discovery of Paleozoic Fossils in Eastern Massachusetts—p. 296. And copious extracts from the Proc. Acad. Philadelphia, Report of British Association, Annales du Mines, &c. CORRESPONDENCE of Mr. J. Nicklés—p. 99-104, 264-269.

PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Ninth Meeting, held at Providence: August, 1855. 8vo. Cambridge. 1856.

MINERALOGY. (Smith, Sanderson) On some new localities of minerals—p.

188, 189. (Smith, Laurence) Re-examination of American Minerals: Part V. Minerals of the Wheatley mine, Pennsylvania—p. 190-204. GEOLOGY. (Whitney) Remarks on some points connected with the Geology of the North shore of Lake Superior—p. 204-209. (Same) Occurrence of ores of Iron in the Azoic System—p. 209-216. (Blake) On the Grooving and Polishing of hard rocks and minerals by dry sand—p. 216-220. (Same) On the Characters and probable Geological age of the Sandstone formation of San Francisco—p. 220 222. (Same) On the Geology of California; from the U.S. surveys for a Railroad route to the Pacific—p. 222-225. (Hitchcock) Description of several Sections lying across the Sandstone and Trap of Connecticut river valley, in Massachusetts—p. 225-228. (Same) Additional facts respecting the tracks of the *Otozoum moodii*, in the Liassic Sandstone of the Connecticut Valley—p. 228. (Same) Account of the discovery of a Fossil jaw belonging to one of an extinct family of Sharks from the Coal formation—p. 229. BOTANY. (Blake) On a peculiarity of the Redwood, *Sequioia*—p. 230. (Same) On the grove of Mammoth trees in Calaveras County, California—p. 231, 232. (Gray) On the *Ammobroma sonoræ*; in a letter to Dr. Torrey—p. 233-236. PHYSIOLOGY. (Brooks) Laws of Reproduction with reference to the intermarriage of First Cousins—p. 236-246. (Kneeland) On the sterility of many varieties of the domestic fowl, and of Hybrid races generally—p. 246-250. (Hilgard) Contributions to the Physiology of Sight—p. 251-271.

RUSSIA.

ARCHIV FUER WISSENSCHAFTLICHE KUNDE VON RUSSLAND, herausgegeben von A. Erman. ERMAN'S ARCHIVES OF RUSSIAN SCIENCE. 8vo. Berlin.

Vol. XIV. 1854, 1855.

(Erman) *Besselia*, a new genus of Zoophyta; with a plate—p. 129-143. Founded on *Gorgonia paradoxa* Esper, from the South Seas, and remarkable for that the usual deposit of calcareous earth in the polypary is here replaced by silica, forming cells filled with an organic fluid. (Bode) Observations on the time of arrival of migratory birds—p. 408-420. (Kessler) On the migration of birds of passage—p. 515-556. (Official Report) On the fisheries of Russia, and of Lake Baikal in particular—p. 588-626. (Baer) On the results of the Caspian Expedition during 1853—p. 312-332. (Same) Studies of the Caspian. I. Analysis of the water of the Caspian, and its influence on the Molluscous animals which inhabit it—p. 627-651. (Ruprecht) Report of a botanical journey in the Government of St. Petersburg—p. 72-96. (Bogorodskji) Sketch of the province Gijiga—p. 333-368. (Erman) Newly observed Tertiary rocks of Rio de Janeiro—p. 144-161. (Wlangal) Geognostical travels in the Eastern part of the Kirghis steppes; continued—p. 43-53. (Abriuzkji) Eruption of the Mud volcano of the Taman peninsula, in August, 1853—p. 68-71. The Mineral springs of Lenkoran—p. 162. Newly discovered beds of coal on the Western declivity of the Ural Mountains—p. 164. Malachite beds of the Ural Mountains—p. 309-311. (J. M.W.P.) The Mineral springs of Transbaikalia—p. 372-382. (Stuckenberg) The localities of sulphur in Russia—p. 383-407. (Doening) The Strata of the environs of Kischenew, the capital of Bessarabia; with a plate—p. 479-485.

NOUVEAUX MEMOIRES DE LA SOCIETE IMPERIALE DES NATURALISTES DE MOSCOU. NEW MEMOIRS OF THE I. SOCIETY OF NATURALISTS OF MOSCOW. 4to. Moscou. Vol. X.; with ten Plates. 1855.

(Fischer von Waldheim) Report of the Operations of the Society from the commencement; on occasion of the celebration of the fiftieth Anniversary, on the 28th of December, 1855—pp. 116. (Hermann) The Heteromerous Mineral System—p. 1-213. The object of this essay is to investigate more closely the irregularities in the commixture of crystallized bodies of like form, and to discover the laws which determine this phenomenon, which may be designated as hetero-

merous Isomorphy, or, more briefly, Heteromery. He takes in order the physical and the chemical properties of heteromerous Crystals, a nomenclature of their composition, and a systematic arrangement of Minerals. The Heteromerous system differs from the Chemical, in regarding most minerals not as primitive Chemical combinations, but as Molecular aggregates. The two agree in commencing with the electro-negative constituents as the ground of classification. According to this principle, the Minerals, with similar or Isomorphous elements, are reduced to eleven classes. Each class is subdivided into seven orders, corresponding to the different systems of crystals. A table is added of the atomic weights of ninety-three different bodies. (Basilewsky) Ichthyography of Northern China; with nine chromo-lithographic plates, from drawings after the life, by a native Chinese artist—p. 215-263. Sixty fishes of Northern China are described, of which four only are referred to as known species. The following new genera of Cyprinidæ are proposed: *Carassius*, with three species, new; *Culter*, type, Cyprinus cultratus L., six species, new; *Abramis*, two species, new; and of Murænidæ *Apterigia*, three species, new. An extract is given from a Chinese work on the fishes used in medicine, which are divided into two orders, those with scales and those without. The Cetacea, Crustacea, and Mollusca are included among the latter. The plates, which exhibit twenty-nine species, are successful specimens of art. (Eversmann) Brief Observations on the occurrence and diffusion of some Mammalia and Birds in the region between the Volga and Ural, and in the Kirghis Steppes—p. 265-281. An appendix to the previous essays by the author, on the same subject, chiefly in the Bulletin of the Society. (Eichwald) On the Natural History of the Caspian; with a plate—p. 283-323. While the shores and bed of this sea are almost an accumulation of empty shells, the living Mollusca are scarce, and limited to a few genera and species. Only where the great rivers, which empty themselves into the Caspian, reduce the proportion of salt in its waters, certain shells, chiefly related to the *Pholadomya*, as *Adacnæ*, &c., are more abundant. The existing species are also in general of small size, presenting a contrast to the great bulk of many in the fossil deposits. Twelve species are more particularly noticed and described; of these, as new, *Paludina spica*, *Dreisena caspia*, *Pholas ustuertensis*, *Cardium ornatum*, *Spirorbis nodulus*.

Bulletin de la Societe Imperiale des Naturalistes de Moskou. Bulletin of the Moscow Society of Naturalists. 8vo. Moscow. Vol. XXIX. A.D. 1856.

(Bogdanoff) Note on the pigment of the feathers in birds—p. 458-462. (Kessler) Contribution to the Ichthyology of South Western Russia—p. 335-393. (Eversmann) The Lepidoptera of Russia, Noctuelites: with three plates—p. 161-233. (Frauenfeld) The lenticular Galls of oaks of Austria; with a plate—p. 394-405. (Turczaninow) Description of the plants growing wild in the countries about Lake Baikal, and in Dahuria; continued—p. 1-87. (Steven) Catalogue of the plants that grow wild in the peninsula of Tauris—p. 234-334. (Eichwald) On the Geographical distribution of the fossil animals of Russia, continued—p. 88-127, 406-453. (Nordenskiold) Demidovite, a new mineral species, from the Ural—p. 128-132. (Kireeosky) Description of a carbonated Chalk on the hills of sand in the Steppes of Central Asia—p. 454-457. Intelligence—p. 133-140, 463. Proceedings: Extraordinary meeting on the 28th of December, 1855, in Commemoration of the Fifty years' jubilee of the Society—p. 141-160.

Acta Societatis Scientiarum Fennicæ. Transactions of the Scientific Society of Finland. 4to. Helsingfors. Vol. IV. A.D. 1855, 1856.

(Arppe) Analysis of Minerals of Finland—p. 561-578. (Moberg) Notices of Minerals of Finland—p. 579-606. (Nordenskiœld) Composition and Crystallography of Malachite—p. 607-610. (Nordmann) Biographical memoir of the deceased Entomologist, Count C. G. Mannerheim—pp. 24.

Oefwersigt af Finska Wetenskaps Societetens Fœrhandlingar. Proceedings of the Scientific Society of Finland. 4to. Helsingfors.

Vol. II. A.D. 1853, 1855.

(Nordmann) On the variable number of the eyes in a species of *Nephelis*, family Sanguisugidæ—p. 1. (Bonsdorff) On the nervous system of *Raja clavata* —p. 10-24. (Same) On the relation of Hydropathy to the process of Animal Rejuvenescence—p. 53-69. (Nordsmann) Rare Vertebrata of Finland, in the University Museum—p. 69-73. (Moberg) Periodical phenomena of Animal and Vegetable life in Aaland—p. 73.

Vol. III. 1855, 1856.

(Bonsdorff) Action of the Heart, considered in the received Physiological point of view—p. 16-25. (Holmberg) A Geological section in Karelen ; with a plate—p. 55-61. (Bonsdorff) On the formation of the Chyle, and its absorption in the intestinal canal— p. 76-91. (Ilmoni) On the Primitive momentum of the circulation of blood in man and animals—p. 91. (Maeklin) On Hermaphroditism in insects, with the description of a Hermaphrodite *Mutilla obscura ;* with a plate—p. 106-112. The great difference between the winged male and the wingless female makes this instance as striking as that of *Formica sanguinea*, noticed by Tischbein in the Stettin Entomological Journal for 1851. (Middendorf) Notice of his work, Isepipteses Russlands, or Principles of investigation of the periods and direction of Migration of the Birds of Russia—p. 112-120. (Nordmann) Notice of the Scientific Expedition to Eastern Siberia, sent out by the Geographical Society of Russia—p. 141-148. Obituary, C. Lundahl—p. 152.

SWEDEN.

Kongl. Swenska Vetenskaps Akademiens Handlingar foer Aar 1854. Transactions of the R. Swedish Academy of Sciences for the Year 1854. Part I. 8vo. Stockholm. 1856.

(Holmgren) Entomological notes of a journey in the South of Sweden, in the year 1854—p. 1-104. This portion of the notes is devoted to the family Ichneumonidæ. In the group Crypti a new genus, *Macrobatus*, is proposed for Cryptus macrobatus Grav., the trivial name being changed to *clavator*. The group Tryphonides comprises the following new genera—*Priopoda* (name too near in form to Priopus), differing from Perilissus by the pectinated ungues, includes Mesoleptus stictieus Grav. &c.; *Lasiops* (name pre-occupied in Diptera), for Tryphon pilosellus Grav.; *Mesoleius*, including Tryphon sanguinicollis Grav., &c.; *Colpotrochia*, for Cryptus mandator Fb., to which the older trivial name *elegantulus* Schranck is restored; *Monoplectron*, a new species *M. zygœnator*, but both the genus and species have been long previously characterized as *Periope auscultator*, Ann. Nat. Hist., A.D. 1838. Vol. II., p. 114. Holmgren has here for the first time made known the male, which has antennæ incrassated toward the tip, as in the other sex, but the abdomen not compressed at the end. In the group Pimplariæ the g. *Chalinocerus* Ratzeburg is rightly identified with *Cylloceria* Schioedte, but it has not been observed that the generic name Lampronota for this group is prior to either of those, dating from 1830. See Curtis's British Entomology, No. 407; Stephens's Illustrations of B. E. Mandibulata, Vol. VII., p. 126; and Ann. Nat. Hist., A.D. 1838, Vol. II., p. 121. The new species described are thirty-eight, some of which may be questionable. (Beurling) Contribution to the Flora of Portobello—p. 105-148. From a collection made by Dr. Billberg, in 1826, chiefly about Portobello. Forty species are described as new, besides several from Panama and other parts. The author seems to have a very limited vocabulary, as nearly every second species is named either *portobellensis* or *billbergianus*. (Thomson) Synopsis of the species of the family Dytisci found in the Scandinavian Peninsula—p. 177-237. The list amounts to 129 species, viz., Haliplus 11, Cnemidotus 1, Hydroporus 51, Hyphydrus 1, Noterus 2, Laccophilus 2, Agabus

26, Ilybius 10, Colymbetes 11, Dytiscus 6, Hydaticus 6, Acilius 2. The new species are Haliplus lapponum (ferrugineus Zett. Ins. Lapp.); Hydroporus arcticus (lapponum Zett. non Gyll.), bohemanni, geniculatus, acutangulus; Agabus zetterstedtii (sturmii var b. Gyll.); Ilybius crassus, similis; all from Lapland, with the exception of this last.

Oefversigt af K. Swenska Akademiens Forhandlingar foer Aar 1855. Proceedings of R. Swedish Academy for the year 1855.

8vo. Stockholm. 1856.

Zoology. (Wahlberg, J. A.) New species of Birds from the Damara country, S. Africa.—p. 213, 214. Alauda grayi, Eremomela damarensis, Erithacus schlegelii, Saxicola albicans, Platystira affinis, Graculus neglectus, coronatus. (Staal) New species of Hemiptera from Caffraria—p. 27-46, 89-100. Describing 157 species of Geocorini, 3 of Ploteres, 8 of Hydrocorini, and 94 of Homoptera. The generic name *Bohemannia* is substituted for Euryprosopum, previously employed among the Coleoptera. (Same) New species of Hemiptera of the Museum at Stockholm—p. 181-192. Ninety new species; and a new genus of Reduvidæ *Hæmatochares*, *H. obscuripennis*, n. sp., from Sierra Leone. (Same) Entomological Notes—p. 343-353. *Pœcilomorpha fairmairei*, n. sp. *Lucastea*, n. g., allied to Pœcilomorpha, but differing in the structure of the antennæ; three species from Port Natal, all new. Synonyms of forty-two species of Hemiptera described by Thunberg in the Acta Societatis Upsaliensis, determined from the original specimens in his collection. Four new species of Forficulariæ from Caffraria. New species of Orthoptera of the Stockholm Museum, viz., Forficulariæ 10; Blattariæ 3; Gryllides 2; Locustariæ, *Clonia* n. g. allied to Listrocelis, *C. wahlbergi* n. sp., from Port Natal; Acridites 6, with a n. g. *Amicus* allied to Mesops, two species, both from Port Natal. (Same) On Cimex stockerus L. and Cimex augur Thunberg—p. 389-392. The four varieties of C. augur given by Thunberg are determined as so many distinct species, one of which belongs to a different group; viz., *a. Odontopus coqueberti* Fb., *β. Dysdercus augur*, *γ.* D. thunbergi Staal, *δ.* D. thoracicus Staal. (Thomson) The Swedish species of g. Oxypoda—p. 193-203. Twenty-five are described, of which *six* given as *new*, Ox. curticollis, planipennis, soror, riparia, laticollis, convexicollis. (Same) The Cyphonidæ of Sweden—p. 317-322. Scirtes 1, Cyphon 13, of which as new C. *nitidulus*, *fuscicornis*, *palustris*, *pallidiventris*. *C. serricornis* Müller is included in the list, but not *C. deflexicollis*, which is so abundant in Britain. (Same) The Trichopterygia of Sweden —p. 335 344. Trichopteryx 10 species, Ptilium 8, Ptenidium 5, Sphærius 1. The new species are *Tr. littoralis*; *Ptil. elongatum*, seemingly very similar to Pt. coarctatum described in this Journal (see Vol. II., Proceedings, p. 122), but distinguishable by the finer sculpture of the thorax; *Pten. turgidum*. Sphærius acaroides occurred abundantly among the fine moss at the edge of a pool in a peat moss. There seems every reason to expect that this insect will be found in the British Islands also. (Wallengren) On Lycæna argus and L. calliopis—p. 205-210. Concluding that L. ægon W. V., which is common in Sweden, should be considered as the true *argus* of Linneus, of which his *idas* is the female. Obvious errors have crept into the diagnoses of these Linnæan species, which the descriptions serve to correct. L. argus Autt. he proposes to call *L. calliopis*, Boisduval having described a variety of it as a distinct species under that trivial name. (Liljeborg) The marine Crustacea of Kullaberg in Scania—p. 117-138. Addenda to the list in the Proceedings for 1852. *Ampelisca eschrichti* Kröyer, as appears from a comparison with the typical specimen, is different from that described, with doubt, under that name in the Proceedings. The supposed sexes of the latter constitute two distinct species, and their characters require the establishment of a n.g. *Haploops*, with two species *H. tubicola* and *carinata*. *Gammarus maculatus* Lilj. is identified with *G. obtusatus* Montague. The new species in this appendix are *Pagurus chiroacanthus; Cuma tumida, ampullacea, rubicunda; Leucon nasicoides; Ampelisca lævigata, tenuicornis; Gammarus erythrophthalmus, macronyx; Anceus*

oxyuræus. The characters of the genera Erichthonius and Ampelisca are newly defined. (Lindström) Larva of a Peltogaster; with figures—p. 361-363. This parasite was found on the abdomen of Pagurus bernhardus, and of another species allied to P. cuanensis. It seems related to, if not identical with, *Peltogaster paguri* Rathke. The larva presents some characters which have been observed in those of the Cirripedia, but not of the Lernæoda hitherto. (Same) The invertebrate fauna of the Baltic, with two plates—p. 49-73. *Pontoporeia affinis*, a new species allied to *P. femorata*, Krøyer. *Bathyporeia* n.g., having some points of resemblance to Anonyx, but distinguished by the absence of claws to the second and fifth pairs of thoracic feet, the peculiar form of the maxillary feet, and the development of the seventh pair of abdominal limbs. *B. pilosa* found on a sandy bottom, at a depth of 18-24 fathoms. See the figures given in Plate II. of this Vol., and the accompanying explanation. Observations on the embryology of *Neritina fluviatilis L.* *Cordylophora lacustris* Allman has been found abundantly in the Gaalœstrat. It is possible that *Tubularia carnea* Agardh may be identical, but the description of this last is not sufficiently explicit to inspire confidence. (Same) On the development of *Sertularia pumila* L.; with figures—p. 365-374. This presents some points of analogy to that of *Campanularia geniculata*, as observed by Lovén and Schultze. It is probable that the Sertularia is a stage of some Medusa. (Kinberg) New genera and species of Annelida—p. 381 388. The new genera are:—Aphroditacea—*Aphrogenia; Laetmonice*, a Swedish species; Iphionea—*Iphione*, type Polynoe muricata *Sav.*; Polynoina—*Halosydna*; *Antinoe*; *Harmothoe*, Aphrodita scabra, *O. Fabr.*; *Hermadion*; Acœtea—*Panthalis*, a Swedish species; *Eupompe*; Sigalionina—*Sthenelais*; *Leanira*; *Psammolyce*, Sigalion herminiæ *Aud. et M. Edw.* The new species amount to 36 in all. (Walhberg, P.) New species of leeches—p. 233-234. *Sanguisuga javanica*, from Java, where it is used medicinally; *S. chloronota*, found in different parts of Sweden, perhaps a mere variety of the S. medicinalis. (Walmstedt) The Swedish species of Clausilia—p. 79-87. Six species are here enumerated, of which C. plicata Drap., an addition to the Swedish Fauna. (Loven) On the development of Chiton; with a plate—p. 169-180. The species on which the observations were made was *Ch. marginatus* Penn. (*Ch. cinereus* L., according to Forbes and Hanley.) The circle of cirri by means of which the young larva moves about in its natatory stage, and which are afterwards cast, seems to correspond to the cirri of the velum in the young of other Gastropoda and of the Acephala. (Retzius) On the skull of a Pampas Indian; with figures—p. 1-6. (Same) On the antrum pylori in man, with figures—p. 219-230. (Boeck) On muscular contraction; with six plates—p. 257 287.

Botany. (Andersson) On the g. *Apluda* L., with a plate—p. 175-180. Six species are described, of which two as new, *A. ciliata* and *scabra*, both East Indian. A humilis Presl. and A. mucronata Steud. are considered to pass over gradually into A. mutica L., so that they cannot be considered specifically distinct. (Same) On Saccharum and the allied genera—p. 151-167. The genera of this group are *Saccharum*, with seven species, S. ciliare n. sp. from Belaspur in the Punjaub; *Imperata*, four species; *Erianthus*, thirteen species, of which new, *E. purpurascens* from Belaspur, *E. longesetosus*, E. Indies; *Miscanthus* n. g. including Erianthus *capensis* Nees, and Eulalia *japonica* Trin; with which M. sinensis And. has been confounded; also Saccharum *prægrande* Steud., *M. luzonensis* And.; a new species is *M. purpurascens* And., in Alstroemer's herbarium in the Stockholm Museum, country unknown, probably Japan or China. (Stenhammar and Floderus) Pulsatilla patens found in Gothland—p. 393. (Fries, E.) Occurrence of the white truffle, *Tuber niveum* Desfont., in Sweden—p. 139. (Wahlberg, P.) Additional localities of the same—p. 394. (Nylander) The distinctions between Lichenes and Fungi—p. 7-11. The lichens are characterized by a thallus furnished with gonidia, which are wanting in the fungi. The hymenium of the former, treated with iodine, assumes a blue, violet, or red colour, while that of the fungi becomes but slightly tinged with yellow in the same circumstances. In the present stage of science, however, it is difficult to draw a pre-

cise line between the two classes, which pass into each other through some of their lowest-organised forms. (Fries, Th. M.) The Lichenes of the Ukrain, with a plate—p. 13-20. Sixty-four species are enumerated, of these new *Biatora polychroa*, which however Massalongo is inclined to identify with Lichen corneus E. B. A new name *Trachylia lucida* is proposed for the *Acolium viridulum* Framm., which is quite distinct from *Tr. viridula* of the same. (Boeck) On the inhalation and exhalation of water by plants—p. 289-303. Geology. (Erdmann) Geological structure of the iron ore district—p. 141-149. (Same) On the sea-level in Saltsjoen and Maclaren, in 1854—p. 75-78. (Same) On the ancient sea marks at Soedra Staeke—p. 321-334. Miscellaneous. (Forssell) On the mud baths of Rolleby—p. 21-25. (Retzius) On ancient ruins in Scania, and heaps of shells in them—p. 231. (Same) Obituary, notice of Duvernoy—p. 323-327. (Wahlberg, T. A.) Letter from South Africa—p. 211. Minutes of Proceedings. Meteorological Observations, &c.

Aars-beraettelse om Botaniska Arbeten och Uptaeckter f. Aar 1851. Report on the Progress of Botanical Science and Discovery for 1851. By J. E. Wikstroem. 8vo. Stockholm. 1855.

Phytography in general—p. 1-63. Floras of particular countries—p. 63-138. Elementary works—p. 138. Horticulture—p. 130-144. Appendix to Do.—p. 313-315. Botanical Journals—p. 144-198. Botanical Geography—p. 199-216. Anatomy—p. 217-220. Physiology—p. 221-231. Palaeophytology—p. 232-241. History of Botany—p. 242. Obituary—p. 243-247. Review of New Works and Botanical Discoveries, in Sweden—p. 248-296. Norway—p. 297-312.

DENMARK.

Oversigt over det Kongelige danske Videnskabernes Selskabs Forhandlinger. Proceedings of the Danish Royal Society. For 1855. 8vo. Kjoebenhavn. 1855.

(Steenstrup) On the remains found in peat mosses, showing that the Beaver, *Castor fiber*, the Capercailzie, *Tetrao urogallus*, the Penguin, *Alca impennis*, and the Land Tortoise, *Emys lutaria*, were former natives of Denmark—p. 1-20, 381-388. (Same) On a pair of maxillæ of a colossal Cephalopod, cast up on the strand of Raaberg in 1853; resembling the genus *Ommatostrephes* D'Orbigny—p. 199. (Schiœdte) Report on the Odonata, Libellulidæ, collected in the expedition of the Galatea—p. 108-125. The species enumerated amount to eighty, of which forty-nine are indicated as new. Several tables are given to illustrate the geographical distribution of the family, from the observations made on this expedition; but the season of the year was in great part so unfavourable for collecting, that this, with other circumstances concurring, detracts from the importance of the materials thus obtained. (Same) On the g. *Broscosoma* Rosenhauer, and its relation to *Miscodera*—p. 351-358. Concluding for the reunion of the two under one genus, Miscodera. The alleged difference in the fore tarsi of the male, Schiœdte did not find substantiated by actual inspection. The choice between the names he has founded not on the intelligible and sure ground of priority, but on a critical reason, which it is clear many entomologists would not assent to. (Same) On the structure of the Thorax in insects, as a ground of classification—p. 358-364. The characters of which LeConte has applied for the classification of the Carabidæ would be adverse to the views maintained in the preceding article. Schiœdte goes into a criticism of them, and examines more particularly the position of the intermediate coxæ in relation to the sternal and pleural divisions of the thorax, which he reduces to four types in the Coleoptera, according as the mesothoracic epimeron and episternon, or one of the two, or neither, forms a portion of the socket of the coxa. Two of these types are exemplified in the Carabidæ; and the further subdivisions of one of the resulting groups are traced out, thus—I. Mesothoracic epimera extending to the coxæ. A. Metathoracic epimera without an external appendage. i. Antennæ

inserted on the front;—1. *Cicindelini.* ii. Antennæ inserted in the cheeks behind the mandibulæ. a. Antennæ without a bed to receive them, their base uncovered;—2. CARABINI (including the ELAPHRINI, also the genera *Loricera* and *Migadops.*) b. Antennæ with a bed to receive them, usually geniculate. * Antennæ with the base uncovered: Tibiæ unarmed; (Mentum connate: Epimera of the mesothorax connate;)—3. SIAGONINI. ** Antennæ with the base covered by a projection of the front: Fore tibiæ palmated;—4. SCARITINI. B. Metathoracic epimera furnished with an appendage externally. a. Antennæ with the base covered by a projection of the front, and with a bed to receive them: Fore tibiæ entire;—5. HILETINI. b. Antennæ uncovered at the base, without a bed to receive them: Fore tibiæ notched;—6. OZÆNINI. (Type *Ozæna*, *Mystropomus*, *Mormolyce.*) II. Mesothoracic epimera not extending down to the coxæ;—The remaining groups of the Carabidæ, of which the arrangement is reserved for the subject of another communication. (Same) Remarks on *Micralymma*, in reply to Erichson's critique of his essay characterizing a second species of that genus—p. 364-366. (Same) Criticism of Lacordaire's Genera of Coleoptera—p. 366-369. (Same) Remarks on the use which Erichson has made of the segmentation of the abdomen, as a systematic character in the Coleoptera—p. 369-375. In these Schiœdte reclaims the priority of various discoveries and observations, which have been adopted, without acknowledgment, by other authors, and seeks to clear them from a variety of additions and misapprehensions with which they have been encumbered by less skilful hands. In many points we cannot deny that he has had good grounds to stand upon; but we think his own scientific reputation is so well established (if all his merits are not yet so generally known as they deserve to be), that such quick susceptibility in the vindication of his originality was not needed to guard the right. As a general rule, also, we are disposed to think a rather less pungent style would befit such scientific discussions better, especially where the pleader has any personal interest in the argument. (Krœyer) On the genus *Sergestes*—p. 22-34. Of this oceanic genus of Crustacea, instituted by Milne-Edwards for a single species, a second was received at the Royal Museum from Greenland, in 1845. Recently nine species more have been procured by a sailor employed by Mr. Fries, in the course of a voyage to the Brazils. Furnished with these materials, Krœyer has here given some additions to the characteristic of the genus, and has described all the eleven species, S. arcticus (from Greenland), tenuiremis, ancylops, oculatus, rinkii, frisii, edwardsii (*atlanticus* M.-Edw.) obesus, armatus, cornutus, corniculum. As eight out of the ten new species were found in one spot, about 42° N. Lat., and 21° W. Long.; Krœyer supposes that may be nearly the metropolis of the genus. (Same) On the parasite Crustacea, *Pachybdella*, *Peltogaster*, and a n. g. *Sylon*—p. 127-131. (Schiœdte) On *Niphargus aquilex*, the second species of this genus, found in England—p. 349-351. A species of this blind genus (first found in the Carynthian grottos) was obtained in considerable numbers from a well at Maidenhead, in 1853. At the time it was announced in several English scientific journals as identical with the Carynthian species. Schiœdte being in London soon after, compared it, and he was able to recognize it at once as distinct from *N. stygius*, although the definite characters which are here given for each of the species are few, and not very striking. See the figures given in Plate II. of this Volume, and the accompanying explanation. (Eschricht, Hanover, Steenstrup) Report on the competition for the prize founded by Classen—p. 412-420. The subject was the development of the Cysticercus of the sheep, *C. tenuicollis.* The prize was awarded to H. Chr. Mœller, an extra prize to Fr. Kuechenmeister. A brief abstract is given of the contents of the two successful essays. (Forchhammer) On the metals found in the calcareous secretions of Marine Animals and Plants—p. 389-401. Of twenty-five Elementary substances found in sea water, and selected not with reference to their universal presence or importance, so much as on account of the facility of detection by analytic methods, the greater number are to be traced among marine animals and plants; a few in the latter class

only. Of the familiar metals, copper, lead, and iron are found with both animals and plants generally; manganese, more abundant than iron in the plants, is eliminated from the animal structures. Zinc, cobalt, and nickel also have been discovered only in the plants. (Steenstrup) Note of Geological Antiquarian researches in Jylland—p. 131.

GERMANY.

Neueste Schriften der Naturforschenden Gesellschaft in Danzig. Transactions of the Danzig Society of Naturalists. New Series. 4to. Danzig.

Vol. V. Part. II. 1855.

(Menge) On the Chernetidæ or Pseudoscorpii; with five plates—pp. 44. A very full and particular account of the internal and external anatomy of this tribe of minute and curious Arachnidans. The family is divided into five genera. 1. Chthonius, one recent species, (perhaps the same as *Obisium orthodactylum* Leach and *Chelifer ischnochelus* Hermann;) and a second in amber. 2. Obisium, one recent species, and one in amber. 3. Chelifer, three recent, and three in amber. 4. Cheiridium, *Chelifer museorum* Leach, and a species in amber. 5. Chernes, *Scorpio cimicoides* Fb., and another recent species, and one in amber. (Klinsmann) Clavis Breyniana or key to "Jacobi Breynii Gedanensis Exoticarum aliarumque minus cognitarum plantarum, Centuria prima, &c.," and to "Johannis Philippi Breynii Icones, fasciculi rariorum plantarum primus et secundus."—pp. 30.

Vol. V. Part. III. 1855.

Contains nothing of Natural History, being entirely Astronomical.

In connection with Danzig, we may here notice also

Programm zu der oeffentlichen Pruefung der Schueler der Petrischule. Programm of the Public Examination of St. Peter's School.

4to. Danzig. 1856.

(Menge) On the indications of the Natural History of the primeval animals contained in amber—pp. 32.

Zeitschrift fuer Entomologie, im Auftrage des Vereins fuer Schlesische Insektenkunde. Journal of the Entomological Association of Silesia. Edited by A. Assmann. 8vo. Breslau. Vol. VIII. A.D. 1854.

Lepidoptera. (Heinemann) Ten new Microlepidoptera—p. 1-7. Penthina obscurofasciana; Carpocapsa herrichiana; Syndemis collicolana; Crambus hercyniæ; Tinea niveistrigella; Oecophora ruficeps; Argyresthia semipurpurella; Coleophora zelleriella, nemorum; Elachista aridella. (Frief) On Notodonta *Glyphidia* crenata—p. 7. (Zeller) Additions to the Silesian Fauna found about Gr. Glogau in 1853—p. 9-14. Coleoptera. (Joseph) Observations on the light of the Glowworm—p. 1 12. (Same) On the Coleoptera of Venice and the Lido, from November to April—p. 13-17. (Letzner) On Cryptocephalus betulæ nanæ, and Donacia palustris—p. 18. The former is C. labiatus (*m.*), C. bothnicus *Fb.*, and C. ornatus *Hbst.* (C. decempunctatus varr. c. d. *Gyll.*) (*f.*); the second reduced to D. sericea. Hemiptera. (Assmann) Catalogue of the Heteroptera that have been found in Silesia up to the present time—pp. 106. These are enumerated by families—Nepoidæ 2, Naucoridæ 1, Notonectidæ 2, Corisidæ 20, Hydrometridæ 9, Limnobatidæ 1, Hebroidæ 6, Reduvidæ 13, Phymatoidæ 1, Acanthidæ 7, Tingidæ 42, Cimicidæ 1, Aradoidæ 7, Phytocoridæ 136, Lygæoidæ 56, Anthocoridæ 11, Coreidæ 17, Berytidæ 9, Megapeltidæ 60: in all 401 species, or four-ninths of the recorded Fauna of this order in Europe, the only families represented therein, which are wanting within the limits of the Silesian Fauna, being the Galgulini and Leptopoidæ. The arrangement of Fieber is followed in this list. We miss here two genera in particular, which, judging from their

known geographical range, were to be looked for in Silesia also ; *Myrmecoris* Gorsky and *Cryptostemma* Herrich-Schæffer. PROCEEDINGS—24 pp.

BERICHTE UEBER DIE VERHANDLUNGEN DER KŒNIGLICHEN SACHSISCHEN GESELLSCHAFT DER WISSENSCHAFTEN. PROCEEDINGS OF THE ROYAL SAXON SOCIETY OF SCIENCE. Math. Physical Class. 8vo. Leipzig.

Vol. for 1854. Part. III. A.D. 1855.

(Weber) On the continuance of Nutrition and Growth of the Nerves, Muscles, and other parts in Abortions destitute of Brain and Spinal Marrow—p. 136-150.

Vol. for 1855. A.D. 1856.

(Lehmann) Investigations of the constitution of the Blood of different vessels, and of the sugar which it contains, in particular—p. 87-122.

Vol. for 1856. Part I. A.D. 1856.

(Volkmann) Experiments on Muscular Irritability—p. 1-10.

ZEITSCHRIFT FUER DIE GESAMMTEN NATURWISSENSCHAFTEN herausg. v. d. Naturh. Vereine fuer Sachsen und Thuringen in Halle. JOURNAL OF THE NATURAL SCIENCES in general, published by the NATURAL HISTORY ASSOCIATION OF SAXONY AND THURINGIA. 8vo. Halle. Vol. VII. ; with four Plates. A.D. 1856.

ORIGINAL ESSAYS (Giebel) On the descent from an original pair—p. 317-339. Concludes entirely against the theory of specific centres of distribution. (Schreiner) On the different periods of development of some species of Lepidoptera—p. 242-246. (Bornemann) Flora of Mulhâusen ; Phanerogama—p. 114-142. (Schmidt) Flora of Mulhâusen : Cryptogama—p. 233-241. (Garcke) On Fumaria wirtgeni *Koch*, F. rostellata *Knaf*, and F. micrantha *Lag.*—p. 493-504. (Baentsch) On the Mineralogical and Chemical properties of the Arseniacal Pyrites of the Carboniferous formation of Loehejuen and Wettin ; with a plate—p. 372-383. (Giebel) Petrifactions of the Muschel-Kalk of Lieskau, near Halle—p. 217-227. On the soft parts of *Orthoceras ;* with a plate—p. 361-367. On a problematical fish from the Copper schist of Mansfeld ; with two plates—p. 367-372. (Osam) On a new discovery of Cinnabar in the Grauwacke, N. Western district of the Upper Harz—p. 20. (Schell) On the vibrations of the rock in mines—p. 228-232. SHORT COMMUNICATIONS. (Keferstein) On the plagues of Egypt—p. 530-541. (Schreiner) Insect enemies of the Orchard—p. 513-520. (Same) Starch and flour of Horse-chesnuts—p. 541. (Irmisch) Remarks on the Flora of Mulhâusen—p. 510. (Andræ) The Tertiary Flora of Gleichenberg in Styria ; with a plate—p. 395. (Chop) On *Trigona cardissoides* and *Nucula goldfussi*, in the Muschel-Kalk of Sondershâusen—p. 392. (Credner) The physical characteristics of Thuringia—p. 520-530. (Giebel) On Hensel's Diluvial *Arvicolæ*—p. 52-56. Remains of Insects in the Lignite of Eisleben ; with a plate—p. 384-386. (Gerhard) Paleontological notes on some points of the Thuringian Zechstein formation—p. 386-392. (Soechting) Notice of some Silicates—p. 56-58. Boring for Rocksalt in Koesen ; the ancient and present valley of the Saal ; Analysis of the Rocksalt—p. 397-405. (Strombeck) Stratification of the Plaener formation of Northern Germany—p. 259. (Zuchold) Biographical Memoir of L. Leichardt ; with a woodcut of the Bottle-tree, *Delabechia*—p. 38-52, 142-159, 246-259, 405-420.

REVIEWS and Literary Notices ; forty-six articles in Zoology ; twenty-seven in Botany ; one hundred and four in Geology, Mineralogy, and Paleontology.

ABHANDLUNGEN DES ZOOLOGISCH-MINERALOGISCHEN VEREINES IN REGENSBURG. TRANSACTIONS OF THE ZOOLOGICAL AND MINERALOGICAL ASSOCIATION OF RATISBON. 8vo. Regensburg.

Part. IV. A.D. 1854.

(Besnard) Report on the progress of Mineralogy during the year 1853—pp. 119. Obituary :—p. 120, 121.

Part V. A.D. 1855.

(Besnard) Report on the progress of Mineralogy during the year 1854; with a plate—pp. 84. Obituary—p. 85.

Part VI. A.D. 1856.

(Besnard) Report on the progress of Mineralogy during the year 1854; with two plates—pp. 64.

Part VII. A.D. 1856.

(Muehle, Henry, Count von der) Monograph of the European Sylviæ; with four coloured plates in 4to.—pp. 152. A posthumous fragment of a work in which the author, an enthusiastic votary of Ornithology, had purposed to give figures of all the birds of Europe which had not been figured before, or only in works so costly as to be inaccessible to the generality of students. The species figured in the present part are *Sylvia erythrogastra* Gould, an old male; *S. erythronota* Eversm., an old male, and a young bird in a transition stage of plumage; *S. olivetorum* Strickl., with nest and eggs, figured before only in Goulds' Birds of Europe; *elaica* Linderm., with nest and eggs, not before figured. Thienemann has given a description and figures of the nest and eggs of both these species, differing in many points, according to Muehle, from the authentic specimens brought from Greece by himself. The remaining figures represent *Sylvia scita* Eversm.; *S. melanopogon* Temm.; *S. cisticola* Temm., with a doubtful variety; and *S. cetti* Marm. After a discussion of the arrangements of the group proposed by preceding authors, he divides it into seven sections; I. Ruticillæ, *Redstarts*; tithys, erythrogastra, phœnicura: II. Humicolæ, *Ground Warblers;* suecica, calliope, luscinia, philomela, galactodes, rubecula: III. Philacanthæ, *Grass Warblers;* nisoria, orphea, atricapilla, hortensis, cinerea, curruca: IV. Dumeticolæ, *Bush Warblers;* ruppellii, subalpina, melanocephala, conspicillata, provincialis, sarda: V. Phyllopseustæ, *Leaf Warblers;* sibilatrix, trochilus, rufa, bonellii: VI. Polyglottæ, *Mockers;* olivetorum, elaica, hypolais: VII. Calamodytæ, *Reed Warblers;* palustris, arundinacea, turdina, scita, phragmitis, aquatica, melanopogon, cisticola, cetti, luscinioides, fluviatilis, locustella. Some of these sections include certain strongly marked forms, which might be separated, but the groups resulting are too poorly represented in the European Fauna to make this necessary. In a supplement, the author has discussed the pretensions of some species which figure in the catalogues of European birds; but of which either the specific distinction or the European habitat seems questionable. These are—Erithacus mousseri *Olph-Gall.;* Cyanecula suecica, wolfii, leucocyana, *Naumann;* S. familiaris *Menetr.;* S. rubricapilla *Landbeck*, (S. naumanni *Müller;*) S. ochrogenion *Linderm.;* S. icterina *Temm.* (S. angusticauda *Gerbes?*), S. sylvestris *Meissner;* S. horticola *Naum.* (Calamoherpe arbustorum, pinetorum, *Brehm*); S. nigrifrons, albifrons, *Bechstein;* S. fruticola *Naum.;* S. lanceolata *Temm.;* Motacilla certhiola *Pallas*. The Appendix contains a notice by Jaeckel of a *Ficedula icterina* shot in the Steigerwald in Upper Franconia; and a communication from Blasius, on the distinctive characters of this species, and *F. trochilus, rufa*, and *sibilatrix*.

Bericht uber die œsterreichische Literatur der Zoologie, Botanik, und Palæontologie u. s. w. Report on the Works on Zoology, Botany, and Paleontology that have appeared in Austria during the years 1850, 1851, 1852, 1853; published by the Zoological and Botanical Association of Vienna. 8vo. Vienna. 1855.

A very useful digest, such as we should wish to have of the progress of Natural History in our own country also, and in other countries of Europe. The main object is to present in one view the advances in the study of the Fauna and Flora of the Austrian Empire, by means of the fullest extracts of all that has appeared on these subjects in publications not devoted to Natural History, and shorter abstracts of articles in works belonging to the science; the diagnoses of the new

species being given in full. Works published in other countries are included, when they relate to Austria. The present Report forms a volume of nearly four hundred closely printed pages.

JOURNAL FUER ORNITHOLOGIE. JOURNAL OF ORNITHOLOGY in general. Organ of the German Ornithological Society. Edited by Cabanis. 8vo. Cassel.

Vol. III. 1854, 1855.

ORIGINAL COMMUNICATIONS. (Boje) Upon the Rubric of Mottos—p. 214-229. (Brehm, A.) The Localities for the Ornithologist in North-Eastern Africa—p. 362-384, 481-496. (Brehm, L.) The Migration of birds—p. 238-255. (Same) The manners of the male birds of prey in the eyry—p. 496-502. (Bruch) Revision of the genus *Larus* L. ; with two plates—p. 273-293. (Gloger) Remarkable observations of Audubon's—p. 17-39, 107-113. (Gundlach) Contributions to the Ornithology of Cuba ; from his letters ; with additions and notes by the editor—p. 465-480. (Hartlaub) On *Tetrao falcipennis* n. sp.—p. 39-42. (Same) Notes on Exotic Ornithology—p. 97-100. (Same) Descriptions of some new species of birds, collected on the Gold Coast, by H. S. Peel—p. 353-361. (Same) Two nondescript birds of the Leyden Museum—p. 361-363. (Homeyer) A few more words on Discoloration—p. 113-117. (Jaeckel) The Migration and various other points of the Natural History of the birds of Bavaria, in the year 1853-1854 ; concluded—p. 417-426. (Meves) On the change of colour in birds, through and also without moulting ; with two plates—p. 230-238. (Mueller) Systematic Catalogue of the Birds of Africa ; continued—p. 1-16, 193-208, 385-400, 449-464. (Paessler) Particulars relating to the colouring of the eggs of birds of prey—p. 209-214. (Verreaux, J. et E.) New birds from the Gabon, West Africa—p. 101-106. (Warthausen, Baron) Natural history of the Wall-creeper, *Tichodromia muraria* Ill.—p. 43-45. CORRESPONDENCE. (Boje) Ornithological Notes—p. 434-8. (Bolle) Notes upon the birds of the Canary Islands ; concluded—p. 171-181. Guano on the west coast of Africa—p. 270. Fragments of a letter on Heligoland—p. 428-432. (Brehm, A.) The Great Pelican of the interior of N. E. Africa—p. 92-4. (Buvry) Operations of late Travellers in N. E. Africa—p. 61-6. Letters from Paris—p. 338-341. (Cabanis) *Buteo tachardus* Vieill. breeding in Europe—p. 94. (Diezel) Proportion between the sexes of Partridges—p. 66-75. (Dubois) Notices of some birds that occurred in Belgium during the last winter—p. 269. (Fritsch) Remarks on some species of Falcons—p. 266-9. (Gloger) Fondness of the Corvidæ for glittering objects—p. 76-9. Preparations for birds that breed in hollow places—p. 80-7. The mocking faculty of *Garrulus glandarius*—p. 87-9. The mode of feeding of *Picus major*—p. 89. An old bird killed by damp cold revived again—p. 91. A tame swan devouring a fish—p. 181. The voracity of the hen-harrier, *Falco palumbarius*—p. 432. Seagulls cast down living shell-fish on bare rocks from aloft—p. 447. Mode of emptying eggs for the Museum—p. 516-521. The larger seagulls breed sometimes in their immature plumage—p. 521. (Hansmann) The marking of the throat has no relation to the song in birds in general—p. 348 351. (Hartlaub) On *Chettusia crassirostris* Fil.—p. 427. (Hellmann) *Otocoris alpestris* shot near Gotha—p. 181. Utility of crow-cots—p. 439-444. (Homeyer) On the change of plumage and colour—p. 347. Remarks on Gloger's extracts from Audubon—p. 438. (Jaeckel) Notes on the Nat. History of the birds of Bavaria—p. 444-6. (Lyall) On the habits of *Strigops habroptilus ;* from the English—p. 503-5. (Mueller) Liability of young chickens to perish by frost—p. 90. (Rimrod) The purpose of the fungous flesh, and its coat of down, on the breast and thighs of the Heron—p. 190. (Sundeval) On *Certhia costæ*—p. 60. (Tschudi) List of birds shot about Vienna—p. 427. (Vangerow) Attempt at a Synopsis of the Birds of Brandenburg—p. 182-190, 338-346. (Wiese) Notes on the Ornithology of Pomerania—p. 505-516. (Wodzicki, Count) The Migration of birds in the Spring of 1855—p. 346. LITERARY INTELLIGENCE, &c.—p. 46-59, 118-170, 255-265, 293-337, 417-426. Reviews—(Bolle) First fruits of modern Spanish Ornithology; translation—p. 295-316.

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NAUMANNIA U. S. W. ARCHIVES OF ORNITHOLOGY, ESPECIALLY EUROPEAN. Organ of the German Ornithological Society. By Baldamus. 8vo. Stuttgart. Vol. V. 1855.

(Altum) Directions for collecting, stuffing, and setting up skins of Birds ; with two plates—p. 29-38, 301-307. (Same) Supplement to the descriptions and figures of the Swans of Germany in the volume for 1854—p. 101-103. (Same) *Cyanecula suecica, orientalis, dichrosterna, wolffii;* with a plate—p. 166-170. (Same) On the bleating of Snipes—p. 362. (Antinori) *Cypselus galilejensis*, a supposed new species of Swift; translated from the Italian ; with a plate—p. 307-311. (Berger) Attempt at a Natural Classification of Birds—p. 196-212. (Blasius) On the questionable species in the list of European Birds—p. 480-489. (Boeck) Preliminary remarks on the Ornithological Fauna of the province Valdivia, in Chili—p. 494-513. (Bolle and Hansmann) Variety of provincial names applied to the birds of Brandenburg—p. 317-321. (Bolsmann) Vulgar names of Birds in Muensterland and Niederstift—p. 313-317. (Brahts) Ornithological Fauna of Neuwied—p. 329-361. (Brehm, A.) Contributions to the Ornithology of North-Eastern Africa, with especial reference to the species which occur in Europe—p. 1-28. (Brehm, L.) The markings of the throat in birds in relation to their vocal powers—p. 54-59. (Same) A word on *Aquila pennata* and *minuta*—p. 60-65. (Same) List of the European birds in species and subspecies—p. 266-271. (Gadamer) Natural History of *Œdemia fusca*, Anas fusca L.—p. 89-92. Of *Numenius arquata*—p. 92-94. Of *Pavo cristatus*—p. 94-96. (Gerhardt) On the habits of the Birds of North America, which occur in Georgia—p. 380-397, 458-469. (Hansmann) On the voice of birds ; in letters to Bolle—p. 96-101, 181-195. (Hummel) Ornithological notes from Courland —p. 321-327. (Jaeckel) Vulgar names of birds of Bavaria—p. 70-73. (Kjærbolling) On the Gentle Falcons of the high Northern latitudes—p. 489-493. (Landbeck) Remarks on the Birds of the Mindelthal and Kamelthal in Bavaria. —p. 73-88. (Olph-Galliard) On the European Redstarts—p. 39-43. (Same) List of the Birds found about Lyons—p. 44-53. (Same) On the Theory of discoloration, exemplified in *Pterocles setarius*, and on the place of the Pterodinæ in the system—p. 311-313. (Selys Longchamps) Addenda to the Remarks on the true Geese of Europe—p. 397, 398. (Wallengren) On Breeding zones of Birds in Scandinavia ; continued—p. 129-165, 429-527. (Warthausen, Baron) The state of birds during the last winter—p. 171-180. (Wodzicki, Count) On *Aquila pennata*—p. 65-69. (Same) On the eggs of the same bird—p. 327, 328. Ornithological Notes from R. Vierthaler's Diary of Travels in Egypt, Nubia, Dongola, and Sennaar; communicated by the Editor, p. 371-380, 469-479. Intelligence—p. 104-127, 213-225, 398-428, 513-522. Report of the Ninth General Meeting of the German Ornithological Society; with a plate—p. 226-265.

Commencing with the year 1856, this journal appears in an enlarged form ; a Number coming out every alternate month, making annually a volume of thirty-six sheets, royal 8vo., with four plates, or with a greater number of plates and less letter-press. Such clear print and fair white paper are absolutely refreshing to the eyes, and not least so by contrast, in juxtaposition with some contemporary scientific journals, also from Germany. The British student of Natural History, whom the agreeable gossip about birds, in the pages of "the Zoologist" or "the Naturalist," may have inoculated with the desire to go a little deeper into the scientific study of this most attractive class of living creatures, will find abundance to gratify the appetite in the perusal of "Naumannia," both as regards the feathered natives of the British islands and the birds of Continental Europe generally, some of which are occasional visitants here, and others may at intervals be driven to our shores by accident; and this, whether his taste be chiefly towards the study of their habits and instincts, or incline rather to the more

abstruse walks of science, systematical or philosophical. It is of a good augury for the progress of Natural History at home, that the study of the German language, so cognate to and illustrative of the more mixed but not less copious English, has become of late so popular a branch of general education. And the lover of Natural History, yet guiltless even of that philological excursion, if he will lay out five shillings on a German Accidence and Vocabulary, and can spare the time requisite, with such a moderate degree of application as may qualify him to glean instruction and improvement from a scientific book in the language, will find his pains amply repaid by the Ornithological matter of this journal. We can heartily recommend the same to all British Ornithologists, who are not acquainted with it already. The London publishers of the Naumannia are Williams and Norgate, and the annual subscription twelve shillings.

WIEGMANN'S ARCHIV FUER NATURGESCHICHTE U. S. W. WIEGMANN'S ARCHIVES OF NATURAL HISTORY; continued by Troschel. 8vo. Berlin.

Vol. XXI. A. D. 1855, 1856.

Part I. ORIGINAL COMMUNICATIONS. (Philippi) On some birds of Chili; in a letter to the Editor—p. 9-14. Including the notice of a new Flamingo, *Phœnicopterus andinus*, native name "Parrina," from the great salt marsh in the desert of Atacama. (Dursy) Contributions to the Natural History of the Snakes of Germany—p. 283-297. (Peters) Synopsis of the Amphibia collected on his travels—p. 43-57. Ninety species are enumerated, of which there are given as new, Platydactylus punctatus; Hemidactylus platycephalus; Diplodactylus pictus; Hoplurus barnardi; *Chalarodon* n. g., distinguished from Enyalus by the subdepressed body, the scales of the head larger, on the rostrum longitudinal and carinated, the neck with deep transverse folds, hypodactyle scales keeled, C. madagascariensis n. sp.; Agama mossambica, armata; *Ichnotropis* n. g., allied to Tropidosaurus, but the hypodactylia carinated, and the nostrils placed between three scutels, S. squamulosa, macrolepidota n. sp.; *Tracheloptychus* n. g., placed between Ptychopleurus and Lacerta, T. madagascariensis; Gerrhosaurus robustus; Euprepes margaritifer, depressus, lacertiformis, komorensis, elegans; Eumeres afer; *Herpetosaura* n. g. of Apod Scinci, H. arenicola; Acontias niger; Typhline aurautiaca; Amphisbæna violacea;—*Ophidians*, Onychocephalus dinga, mucruso, mossambicus, trilobus; Stenostoma longicaudum, scutifrons; Homalosoma variegatum; Lycophidium semiannulis; Coronella semiornata, olivacea: *Uriechis* n. g., U. nigriceps (Elapomorphus capensis *Smith?*), lunulatus; *Rhamphioplus* n. g., R. rostratus; Naja mossambica; Vipera superciliaris;—*Amphibians*, Rana mossambica; Cystignathus argyreivittis; Pyxicephalus edulis, marmoratus; *Chiromantis* n. g., C. xerampelina; Hyperolius bvittatus, tæniatus, marginatus, argus, flavoviridis, tettensis; Engystoma marmoratum; Breviceps mossambicus. (Same) Synopsis of the Fishes observed in Mozambique—p. 234-282. The new species are—Serranus flaveguttatus, melas, squamipinnis, abdominalis, goliath; Platycephalus pristis; Scorpæna mossambica; Apistus binotatus; Coruna dorsalis; Sargus auriventris; Atherina atra; Chætodon nigripinnis; Peloscirtes cynodon, barbatus, elongatus; Gobius obscurus, capistratus, signatus, atherinoides; Callionymus marmoratus; Amphysile brevispina; Fierasfer neglectum; Cossyphus opercularis, tæniops, filamentosus; Pomacentrus annulatus; Glyphisodon fallax, sculptus; Muræna fascigula, vermicularis, diplodon; Ophiurus marginatus; Sphagebranchus brevirostris; Tetrodon ocellatus, tæniatus; Monacanthus frenatus; Syngnathus mossambicus; Torpedo fusco-maculata. (Gunther) Contributions to the Natural History of the Freshwater Fishes of Germany; with figures—p. 197-212. (Kaup) On the Synonymy of Symbranchus immaculatus *Bloch*—p. 58-61. (Same) *Enchelynassa*, a new genus of the family of eels, with figure—p. 213. (Same) Synopsis of the species of some families of Sclerodermi—p. 215 233. (Agassiz) Supplementary remarks on the Holconoti; extracted from Silliman's American Journal of Science, XVII.; translated by the Editor—p. 30-34. (Gibbons) Description of new fishes of the family Holconoti, from the Bay of San Francisco, the Sacramento river, and its Lagoons—

p. 331-341. (Girard) On the viviparous fishes of the west coast of North America—p. 342-354. Both extracts from Proceedings of Philadelphia Academy: translated by the Editor. (Reissig) On the mode in which the Tachinæ effect their escape out of the puparia, and out of the closed cavities in which they are often found—p. 189-196. The author dismisses entirely the idea of any liquid solvent being used for this end, and considers the force as entirely mechanical, the head, swelled into a globe by fluid pumped into it, acting as a hydraulic press, assisted by the points of support which the bristles of the abdomen afford. (Krohn) On the heart and circulation in the Pycnogonidæ; with a figure—p. 6-8. The circulation was observed by Beneden in the legs of Nymphon, but he could not find the heart. This organ, the existence of which has been generally negatived by Quatrefages, was demonstrated by Zenker in Nymphon pallipes. A more particular account of its structure, and of the phenomena of circulation, are given in the present essay. (Steenstrup) Observations on the genera *Pachybdella* Dies., and *Peltogaster* Rathke, parasites on the abdomen of Crustacea; extract from the Proceedings of the Danish Society of Science, A.D. 1854; translated by Creplin—p. 15-29. Steenstrup considers both these forms to be crustacean, and shows that they are not hermaphrodites, but leaves their place in the class doubtful. (Same) Supplement to the preceding article—p. 62. (Zaddach) *Holopedium gibberum* a new form of the Branchiopoda; with two plates—p. 159-188. (Grube) Descriptions of new or little known Annelida, with three plates —p. 81-136. *Dendronereis* n. g., *D. arborifera* n. sp. (Same) Remarks on some Helminthes and marine worms; with two plates—p. 137-158. (Leuckart) On the young of some Annelida, a contribution to Embryology; with a plate—p. 63-80. The relation of *Mesotrocha* as a younger state of *Chætopterus; Alciope raynaudii. Malacoceros longirostris* Quatrefages Mag. Zool., A.D. 1843, not separated from *Nerine*, the eyes often becoming obsolete in the mature state of these worms. (Peters) On the g. *Bdella* Sav. and the Annelida observed in Mozambique—p. 35-42. *Calymmatops* n. g. of Terebellæ, *C. granulatus* n. sp., and ten new species of other genera. (Troschel) Two new Heteropoda, *Firolella gracilis* and *vigilans*, from Messina, with a plate—p. 298-311. (Krohn) Supplement to the essay on *Echinospira diaphana*, see the Archives for 1853; with figures—p. 1-5. (Rœmer) On the structure of *Melonites multipora*, an Echinid of the American Carboniferous limestone; with a plate—p. 312-330.

Part II. ANNUAL REPORTS on the progress of Natural History, for the year 1854; viz., Mammalogy, by Wagner—p. 1-42; Ornithology, by Hartlaub—p. 43-74. Entomology, by Gerstæcker—p. 111-144. Also the Natural History of the lower animals, from 1848 to 1853; Conclusion, comprising the Protozoa, by Leuckart—p. 75-110.

The other Reports have not yet come to hand.

ARCHIV FUER ANATOMIE PHYSIOLOGIE AND WISSENCHAFTLICHE MEDECIN herausgeg. v. Dr. Joh. Mueller. MUELLERS' ARCHIVES OF ANATOMY, PHYSIOLOGY, AND SCIENTIFIC MEDICINE. 8vo. Berlin.

Year 1856; with eighteen Plates.

PHYSIOLOGY IN GENERAL, ETC. (Donders) Critical and experimental contributions to Hæmodynamic—p. 433-466. (Fick) On the attachment of the Muscular fibres to the Tendons; with figures—p. 425-432. (Frerichs and Stædeler) Further contributions to the history of the conversion of organic substances—p. 37-54. (Frerichs) On the conversion of Gallic acid into colouring matter—p. 55-61. (Heidenhain) Historical and experimental inquiry into Muscular Tonus; with a plate—p. 200-229. Confuting the Theory of "Tonus," as regards the Animal muscles in particular. (Mayer) On spontaneous motion of Muscular fibrils; in reply to Schulz-Schulzenstein—p. 321, 322. (Volkmann) Investigations of Hæmodynamic, with a reference to the most recent views of Donders—p. 523-539. (Wittich) On the diffusion of Albumen; Prolegomena —p. 286-310. HUMAN and COMPARATIVE. (Billroth) On a fœtal glandular structure of swellings of the Thyreoid glands; with a plate—p. 144-149. (Fick)

On the Vas Deferens; with figures—p. 473-489. (Hirt) On the numerical proportion between the White and Red Blood cells; with a plate—p. 174-199. (Luschka) The sensitive branches of the nerves of the Nervus Hypoglossus in man; with a plate—p. 62-82. The filaments which run to the Hypoglossus, whether direct, or through the medium of the Ganglion submaxillare, as originating from the Lingualis, have a sensitive function, and are recurrent in, or on the main stem of the Hypoglossus, to the spot where they are destined to diffuse themselves in the Periphery. (Same) On the presence of a Supraclavicular Muscle in man; with a plate—p. 282-285. VERTEBRATE. (Busch) Vital phenomena in the Pigment cells; with a plate—p. 415-424. Observed in larvæ of frogs and newts. (Mueller) Embryology of Petromyzon; Preliminary report—p. 323-329. (Reichert) On the Micropyle of fishes' eggs; and on a peculiar structure, not before discovered, of the mature and impregnated eggs; with plates—p. 83-124. (Same) On the Mueller-Wolffian bodies in embryos of fishes, and the so-called rotations of the yelk in the impregnated egg of the Pike; with figures—p. 125-143. (Remak) On the terminations of the Nerves in the Electric organs of the Torpedo—p. 467-472. INVERTEBRATE. (Filippi) On the origin of Pearls; from the journal Cimento, Fasc. IV. Turin, 1852; translated by Küchenmeister, with Notes from his own investigations—p. 251-268. (Same) A word more on the formation of Pearls; in reference to Küchenmeister's remarks—p. 490-493. (Küchenmeister) On one of the most frequent causes of the existence of pearls in the Elster muscles (Anodontes); and a plan proposed for the artificial multiplication of pearls—p. 269-281. Most of the pearls in question were found to have the body of a water-mite, *Atax ypsilophora*, for their nucleus. (Schlossberger) Concretions in the organs of Bojanus, from Pinna nobilis—p. 540-543. (Krohn) Observations on the development of the Pteropoda, Heteropoda, and Echinoderma; in a letter from Funchal—p. 515-522. (Gegenbaur) On the Marginal bodies of the Medusæ; with a plate—p. 230-250. Great differences are found in the structure of these, in going from the lower forms to the higher which are provided with a velum—Medusidæ—Rhizostomidæ; and within the limits of the several groups there is an evident progression from a lower to a higher type of organization in this respect. The presence of a pigment spot in some of the higher forms makes it less surprising to find in some an evident refracting lens, as in *Nausithoe albida* Geg.; in *Carybdea marsupialis* this attains a considerable size, with a distinctly globular figure. The regular transition from this structure, and the indubitable analogy, to the vesicular form of the marginal bodies, with concretions enclosed, but destitute of crystals, in the lower forms, in which they have been considered as auditory organs, tends to cast some degree of doubt on this interpretation of the phenomena. (Schultze) On the structure of the gelatinous disc of the Medusæ; with two plates—p. 311-322. (Lachmann) On the organization of the Infusoria, and of the Vorticellæ in particular; with two plates—p. 340-398. (Weisse) A little addition to Schneider's Contributions to the Natural History of the Infusoria; with a plate—p. 160-164. On the encystment of *Chlorogonium euchlorum*, chiefly. (Lieberkuhn) Contributions to the Anatomy of the Infusoria—p. 20-36. (Same) On parasitic pouches attached to the larvæ of Phryganidæ; from the Monthly Report of the Berlin Academy of Science, April, 1856; with figures—p. 494. (Same) On the development of Spongillæ—p. 1-19. Addenda to the same; with figures—p. 496-514. The following is a summary of the most important conclusions to which the author has come in the course of this inquiry. The embryos are covered with a ciliary epithelium on the entire upper surface: they proceed from the so-called conglomerations of germinal granules; as soon as the ciliated embryos attach themselves, they take the form of the perfect Spongilla: the contractile cells of the latter are formed after the loss of the germinal granules, partly in the ciliated embryo, partly after the disappearance of the cilia; this is what is called a "Generatio æquivoca" of the cells, or an extracellular cell-formation: the siliceous spicules originate in the interior of the cells, the corneous substance of the framework of the gemmule-

shells is an excretion of the cells: the young Spongilla, soon after the attachment of the embryo has taken place, acquires a tubular process, with an aperture that can be closed, out of which solid substances are expelled in the liquid current; besides this there is at least one place at which foreign substances are occasionally taken up; otherwise the body of the young Spongilla is impervious: in the fully developed Spongilla ciliary cells occur: the spicular substances are not the internal skeleton of the Spongilla, but a frame which it can leave under certain circumstances: this often occurs before the Spongilla dies, and also during the formation of the gemmules; the gemmules are not eggs, but rather a sort of cysts or houses, out of which the same creatures which have formed them escape again through the pore. Immediately after their escape, and even just before it, division of cells and formation of new spicules takes place. The Spongillæ, after they have emerged, acquire tubular processes; they either attach themselves to the frame in which the containing gemmules were fixed, and live as colonies upon it; or each individual forms a new frame, in case the gemmule was no longer in that position, when its inhabitant escaped from it; the corpuscles considered as the eggs of the Spongillæ have, besides the germinal granules, a germinal vesicle and spot, of which there is no trace in the ordinary conglomerations of germinal granules: the bodies considered as Spermatozoids are developed in immoveable capsules, and in their essential characters do not differ from those of many other animals. (Schultze) Observations on the propagation of the Polythalamia; with a plate—p. 165-173. With reference in particular to a *Triloculina* and to *Nonionina silicea*.

The concluding Part for 1856, which should contain the Report on the progress of Zootomy, has not yet come to hand.

Linnaea, ein Journal fuer die Botanik in ihrem Ganzen Umgange. Linnaea, a General Botanical Journal. Edited by Schlechtendahl. Vol. X. Parts V., VI. 1854.

(Schlechtendahl) Catalogue of the species of *Panicum*, in Kunth and Steudel; with Observations on the genus—p. 529-602. (Bentham) The plants collected in Australia by Mueller; Mimosæ; with the addition of some new Australian species, collected by Drummond and others—p. 603-630. (Schlechtendahl) The plants collected in Columbia by Wagener; continued; Dicotyleae —p. 631-674. (Willkomm) On the Alterations which the composition and physiognomy of the vegetation of the Iberian Peninsula has undergone through the agency of man during the middle ages and in later times—p. 675-704. (Preuss) Synopsis of Fungi examined, chiefly from the environs of Hoyerswerda; continued—p. 705-725. (Schlechtendahl) Botanical Miscellanies—p. 726-734. New plants and Memoranda of Botanical Gardens, for 1852—p. 735-766. (Rach) The Ericacea of Thunberg's collection, compared with those of the Royal Herbarium at Schœneberg near Berlin—p. 769 792. Index—p. 793-807.

Jahrbuecher des Vereins fuer Naturkunde im Herzogsthum Nassau. Annals of the Association of Natural Science in the Duchy of Nassau. 8vo. Wiesbaden. Part X. 1855.

Additions and Corrections to the Catalogue of the Lepidoptera of the environs of Wiesbaden, in part VI.—p. 87-126, 356-360. (Schenck) On some difficult genera and species of bees—p. 137-149. Remarks on the varieties of some species of *Bombus*; and on the species of the g. *Coelioxys*, which occur in Nassau, with an attempt at assigning the sexes to their proper partners. (Same) On the ant named *Eciton testaceum* in part VIII., *Strongylognathus testaceus* Mayr—p. 150. (Same) Index to the descriptions of the bees of Nassau in Parts VII., IX., X.—p. 151-160. (Kirschbaum) Contributions to the History of the Hemiptera. I.: Capsini of the district of Wiesbaden—p. 161-348. An hundred and fifty four species of the family are enumerated and characterized after the analytic method; while very full descriptions are given of thirty new

species, averaging nearly two pages to each species. (Sandberger) *Clymenia subnautilina*, n. sp., the first and only species of the genus found in Nassau, with a plate—p. 127-136. (Same) Concise notice of the work "Petrifactions of the Rhenish formation in Nassau," with a comparative table of the members of that System—p. 85, 86. (Dollfuss and Neubauer) Analysis of some specimens of the Schalstein of Nassau—p. 49-82. (Fresenius) Analysis of the chief mineral waters of the Duchy of Nassau, IV., The mineral springs of Langenschwalbach—p. 1-48. Proceedings, &c.

Wuertembergische Naturwissenschaftliche Jahreshefte, herausgegeben von Dr. H. v. Mohl. u. s. w. Annals of the Wuertemberg Association of Natural Science. 8vo. Stuttgart.

Volume XII. Parts I. and II. 1856.

Zoology. (Koenig-Warthausen) Contribution to the Fauna of Wuertemberg—p. 72-89. (Weinland) On the tooth with which the young of the common ringed snake, *Tropidonotus natrix*, is provided, in order to make its way out of the egg; with a plate—p. 90-95. Appended are some remarks on the indefinite nature of the characters that have been employed to distinguish the species of these reptiles. (Klein) On the apparatus for moving the tongue in *Manis macroura* Desm. (*M. crassicaudata* Griffith)—p. 96-99. (Krauss) Occurrence of the black rat, *Mus rattus*, in Wuertemberg—p. 117. Botany. (Koenig-Warthausen) On a plant of *Agave americana* which produced eight flower-stems—p. 100-103. Paleontology. (Oppel) On some Cephalopoda of the Jurassic strata of Wuertemberg—p. 104-108. (Quenstedt) On *Pentacrinites colligatus*; with a plate—p. 109-116. (Oppel) On the Jurassic formation of England, France, and South-western Germany; Section I., the Lower Lias; Section II., the Middle Lias—p. 121-312.

Proceedings, Etc.—p. 1-71. (Rapp) Hybernation of animals—p. 23-31. (Krauss) Insects injurious to Agriculture—p. 52-55. (Fleischer) *Coccus abietis* L. and its parasites—p. 59. Besides the Coleopterous and Hymenopterous parasites, three species of *Psocus* are enumerated; a circumstance which seems to require more elucidation than is here afforded. (Veesenmeyer) Notice of a Herbarium vivum, formed in the end of the 16th century by H. Harder—p. 55-59. (Volz) Note on same—p. 120. (Jaeger) On the relation of parasitic plants to the plant on which they grow—p. 63-70. (Kurr) The terrestrial and fluviatile shells of the Tertiary formation of Upper Swabia—p. 38-47. (Fehling and Kurr) Analysis of fossil fishes' teeth—p. 118. (Fraas) On the deposits of petrifactions in the Jurassic strata—p. 43-47. (Bühler) On the relation of the river basins and the water-shed to the mountains—p. 47-52.

Abhandlungen der Math. Phys. Klasse der K. Bayerischen Akademie der Wissenchaften. Transactions of the R. Bavarian Academy of Science. Math. Physical Class. 4to. Munich. Vol. VII. 1853-1855.

(Fischer) Contribution to the Natural History of the Ostracodea; with two plates—p. 635-666. The author questions some of Zenker's recent statements as to the composition of the oral organs in this order. The following new species are described:—*Cypris socialis*, *declivis*, *prasina*, *madeirensis*, *exerta*, *palermitana*, *nitens*, *triangularis*, *rivularis*, *exsculpta*, *narcotica*, *aspera*; *Paradoxotoma* n. g. of Cytheridæ, *P. dispar* n. sp.; *Cythere maculata*, *lurida*; *Asterope grœnlandica*. Several of the species of Jurine, which had remained doubtful in consequence of the brevity of his descriptions, are also illustrated. (Martius) Attempt at a Commentary on the Plants in the works of Marcgrave and Piso on Brazil; with additional illustrations of the Flora of the empire, Section I., Cryptogama—p. 179-238. (Schœnbein) On the proximate cause of the blue tinge which some Fungi acquire spontaneously—p. 723-733. (Treviranus) On the structure and development of the ovules and seeds of the Mistletoe; with two plates—p. 151-178. (Roth and Wagner) The Fossil bones of Pikermi, in Greece; with eight plates—p. 371-464. See a brief notice at page 17 of our preceding volume.

(Wagner) Description of some fossil Chelonians, and other Reptilian remains, in the Lithographic slates and Green sandstone of Kelheim; with three plates—p. 239 264.

Lotos, Zeitschrift fuer Naturwissenschaften. Journal of Natural Science of the Lotos Society in Prague. 8vo. Prag. Vol. VI. 1856.

No. 1. January. Proceedings. (Reuss) A new locality of Fluviatile quartz in Bohemia—p. 3. (Durand and Hilgard) New species of plants of S. California; extract from the Journal of the Academy of Natural Sciences of Philadelphia, Vol. III., 1855—p. 5-9. (Kirchner) On the resinous galls of Coniferæ—p. 9 12. (Micksch) On fossiliferous Quarzite balls of the environs of Rokycan—p. 12-14. Notice of the late C. Presl's Herbarium, offered for sale—p. 15-17. (Opitz) Additions to the list of Lichens—p. 19-22. Miscellaneous—p. 22-24.

No. 2. February. Proceedings. (Du Bus) Characters of some n. spp. of birds; extract from the Bulletin of the R. Belgian Academy, Vol. XXII., 1855—p. 26-28. (Kirchner) Parasitic Hymenoptera reared from Aphides of Kaplitz—p. 28 33. (Same) The Ichneumones of Kaplitz—p. 33-40. (Opitz) Additions to list of Lichens—p. 41-45. Miscellaneous—p. 45-48.

No. 3. March. Proceedings. (Kirchner) The Ichneumones of Kaplitz; continued—p. 63-67. (Opitz) Observations on the Flora of the Niger—p. 67-69. Miscellaneous—p. 69-72.

No. 4. April. Proceedings. (Massalongo) Twenty-one new species of Lichens of the province of Verona—p. 76-83. *Collemeae*—Collema capniochroum; Acarospora velana; Solenospora vulturiensis; *Lecanoreae*—Pyrenodesmia tauriliana; Zeora detrila; *Lecideae*—Diplotomma turgidum; *Biatoreae*—Bilimbia cuprea, chlorotica; *Sarcogyneae*—Sarcogyne pinicola; *Dermatocarpeae*—Placidium castnani, insulare, marcomanici; Catopyrenium tremniacense; *Verrucarieae*—Verrucaria plicata, pinguicula; Amphoridium cinereum; Polyblastia sepulta; Artrhopyrenia furfuracea, atrosanguinea; *Coniangeae*—Coniangium krempelhuberi; *Coniocybeae*—Coniocybe baeomycioides. (Feismantel) On the ferruginous Quartz of Hyskow—p. 90. (Ruprecht) The Nymphæaceæ of the Government of St. Petersburg; extract from the Bulletin of the Academy of St. Petersburg, A.D. 1854, with a note by Weitenweber—p. 91-93. Miscellanies—p. 93-96.

Korrespondenz-Blatt des Zoologisch-Mineralogischen Vereines in Regensburg. Monthly Journal of the Zoological and Mineralogical Association of Ratisbon. 8vo. Regensburg.

Vol. VIII. A.D. 1854.

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Schæffer) Systematic Catalogue of the Lepidoptera of Europe, including the species of Siberia and Asia Minor, usually reckoned along with them—p. 17-47. (Koch) On the Distinctive Characters of Species in the Araneidæ in general, and the genus *Amaurobius* in particular; with a plate—p. 158-168. (F.) Note on the River Pearl-muscle, *Unio Margaritifera*—p. 150-152. GEOLOGY. (Besnard) Addenda to the "Minerals of Bavaria, with their localities"—p. 55. (Hahn) On the occurrence of Native Antimony and its Oxyde in the Mines of Brandholz—p. 9-12. (Hornberg) Brief Mineralogical Notes—p. 50. (Micksch) Notice of Minerals occurring in the Coal Measures of Bohemia—p. 13-16. (Wineberger) Geological Section of the Galgenberg, near Erbendorf; with a plate—p. 53. (Same) Supplement to Guembel's List of the Minerals of the Upper Palatinate, in Vol. VII.—p. 153-158. (Dumoulin) Obituary of the Count von der Muehle—p. 171-181. (Schuch) Annual Report of the Association—p. 1-8. Proceedings, &c.

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Vol. VIII.; with thirty-one Plates. A.D. 1854.

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(Ettinghausen) The Eocene Flora of Mount Promina in Dalmatia; with fourteen plates—p. 17-44. (Fenzl) Cyperus jacquinii *Schrad.*, C. prolixus *Kunth.* and Comostemum montevidense *Esenbeck;* an essay towards an estimate of the value of the distinctive characters of the species in the g. Cyperus; with three plates—p. 45-64. (Hyrtl) On the connection of the generative and urinary organs in the Ganoid fishes; with three plates—p. 65-72. (Same) Anatomy of *Heterotis ehrenbergii;* with three plates—p. 73-88.

PART 2nd. Communications not by Members. (Langer) Vascular System of the Anodontes: Section I.; Arterial and Capillary System; with two plates—p. 15-26.

Vol. X.; with twenty-six Plates. 1855.

(Hyrtl) On the Accessory Branchial Organs of the Clupeacei; and Observations on the intestinal canal of the same; with three plates—p. 47-57. (Diesing) Nineteen species of Trematodea; with three plates—p. 59-70. These are, 1 of Diplostomum, 3 of Hemistomum, 6 of Monostomum, and 9 of Distomum; all but two collected by Natterer in Brazil. *Distomum dimorphum* originally inhabits fresh water fishes of Brazil, but attains its full length and perfect development in the intestines of the Herons, which feed on the fish. (Reuss) Paleontological Miscellanies; with seven plates—p. 71-88. On a fragment of a skull of the *Dodo*, in the Prague Museum. Remains of an Emydian, *Chelone benstedi* Owen, in the Bohemian Plæner-kalk. On a new Crustacean of the Bohemian coal-formation, provisionally regarded as the type of a new genus *Lepidoderma*, but at least closely related to Eurypterus. Remains of Reptiles in the Plæner formation of the White mountain near Prague.

PART 2nd. Communications not by Members. (Lenhosšék) On the minute structure of the central nervous system in man; with four plates—p. 1-70. (Lorenz) On the Stratonomy of *Ægagropila sauteri;* with five plates—p. 147-172. As the result of these observations, modifications of the characters of the genus, as given by Rabenhorst and by Kuetzing, are here proposed. (Hoernes) On some new fossil Gastropoda of the Eastern Alps; with three plates—p. 173-178. The species illustrated are Chemnitzia eximia, tumida, rosthorni; Nerita prinzingeri; Natica plumbea, amplissima; Purpuroidea reussi.

Vol. XI.; with sixty-one Plates. 1856.

(Hauer) On the Cephalopoda of the Lias of the North-Eastern Alps; with twenty-five plates—p. 1-86. New species, Ammonites grunowi, escheri, lilli, tirolensis, erbaensis, mercati, latesulcatus, salisburgensis, adnethicus, fœtterlei, petersi,

grohmanni, altus, czjzeki; Nautilus austriacus. The total number of species determined amounts to 71, of which 14 occur in the lower, 64 in the Upper Lias, 7 being common to both the beds. (Richter) A contribution to the Paleontology of the Thuringian forest; with three plates—p. 87-138. (Unger) The Slate and Sandstone Flora, a contribution to the Paleontology of the Thuringian Forest; with thirteen plates—p. 139-186. (Heckel) Contributions to the fossil Ichthyology of Austria; with fifteen plates—p. 187-274. (Diesing) Twelve species of Acanthocephala; with three plates—p. 275-290. The characters of the Tribe are given, with a general view of the Structure and Embryology. The twelve species of *Echinorrhynchus* described and figured are characterized in the author's Systema Helminthum. They were all collected in Brazil by Natterer, except the last, *E. turbinella*, which forms a peculiar group, characterized by the possession of a distinct receptacle for the haustellum. This species was taken from the intestines of Delphinus hyperodon.

Part 2nd. Communications not by Members. (Rathe) Observations on the Carotids of Snakes—p. 1-22. Showing that the existence of a single Carotid observed in various Ophidians, and treated by Cuvier as a character of the whole class, is actually limited to a certain portion of the wide-mouthed snakes; the rest, and all the small-mouthed snakes, having a pair of common carotids. (Guembel) Notes upon the dying lichen *Lecanora ventosa* Ach., with an essay on the development of Lichenes; one plate—p. 23-40.

Sitzungsberichte der K. Akademie der Wissenschaften. Proceedings of the Vienna Academy. 8vo. Vienna.

Vol. XIX.; in two Parts; with thirty Plates, and three Maps. 1856.

Zoology. (Langer) On the calci-tibial joint in Mammalia and Man—p. 117-121. (Engel) On the growth of hairs that have been clipped; with two plates—p. 240-254. (Heuglin) Classified list of the birds of North-Eastern Africa, including the Arabian coasts of the Red Sea, and the region of the sources of the Nile as far south as four degrees North latitude—p. 255-324. The list comprehends 754 species. (Hyrtl) On Mormyrus and Gymnarchus—p. 94-97. (Diesing) Twelve species of Acanthocephala—p. 97. (Wedl) On the oral organs of the Nematodea; with three plates—p. 33-69. The Nematodea have no proper head furnished with organs of sense. The knots and papillæ, which Siebold, in his Comparative Anatomy of the Invertebrata, has considered as organs of touch, are mere thickenings of the Chitine integument. The oral organs naturally vary much according to the mode of life, and are very complicated in many Nematodea. (Same) On some Nematodea; with a plate—p. 122-134. *Filaria flexuosa* n. sp., in swellings under the hide of the red deer. *F. clava* n. sp., from the cellular membrane about the trachea of a house pigeon. *Trichosoma pachykeramotum* n. sp., from the intestine of the hunting leopard. *Trichosoma papillosum* n. sp., from the intestine of a sheep. Remarks on the g. *Trichina*. (Frauenfeld) On the genus *Carychium*; with a plate—p. 70-93. Of this genus, which is peculiarly attached to the dark and moist nooks of subterranean caverns, nine species are admitted. *C. amoenum* a new species is figured, as well as *C. schmidtii*, *lautum* and *obesum*, the figures of the last two, given in the volume for 1854, not being sufficiently characteristic. (Schmidt) The Embryology of the Najades; with four plates—p. 183-194. *Anodonta cygnea* and *Unio pictorum* form the subject of these observations. The mode of development differs in some points from that observed by Leuckart in *A. intermedia*, showing the prudence of avoiding hasty generalization from particular instances. Geology and Paleontology. (Zeuschner) Geognostical description of the Lias limestone in the Tatra and adjoining mountains; with woodcuts and two plates—p. 135-182. *Ammonites leptoviensis*, a fine and very variable new species, described and figured. (Neugeboren) On the Foraminifera of the order Stichostegia, in the Clay, "Tegel," of Upper Lapugy, in Siebenbuergen—p. 333-335. (Haidinger) On Dechen's new Geological Map of Rhenish Westphalia—p. 336-338. (Zepharovich) The peninsula Tihany in

the Plattensee, and the immediate environs of Fuered; a contribution to the Geology of Hungary; with two plates—p. 339-373. MINERALOGY, CRYSTALLOGRAPHY, &c. (Leydolt) On the Structure and Composition of the Crystals of primitive Calcareous Haloid, Arragonite, and an Appendix on the structure of the Calcareous Parts of some Invertebrate Animals; with nine plates—p. 10-32. (Volger) On Asterismus—p. 103-116. (Haidinger) Report on the same—p. 98-102. (Grailich) Refraction and Reflection of Light at the double surfaces of Crystals of single optical axis—p. 226-230. (Strasky) Analysis of Anthracite Coal, from the neighbourhood of Rudolfstadt, near Budweis, in Bohemia—p. 325-332.

Vol. XX. Part I.; with nine Plates. 1856.

ZOOLOGY. (Pelzeln) New and imperfectly known species of the Imperial Ornithological collection; with two coloured plates—p. 153-161. The new species are *Dacnis nigripes*, from New Friburg, Brazil, allied to D. cyanocephalus, but differing by the shorter, stouter bill, and the blackish legs, as well as the plumage, figured; *Phyllornis frontalis* Natterer MSS., from Khelgat near Goa, figured; *Furnarius longirostris*, from Venezuela, distinguished from F. leucopus *Swains*, by the longer bill and differences of the plumage, figured; *Synallaxis kollari*, distinguished from S. candei *D'Orb.* by the rufous tail, ferruginous cheeks, and black throat, the feathers of which are merely edged with white, figured; *S. striolata; S. albilora; S. inornata;—S. vulpina.* Natterer; *Cyanocorax heckeli*, like C. azureus Temminck, but of a different hue, inclining more to violet;—*C. diesingii*, like C. pileatus, but the spots at the eye and at the base of the bill are much smaller, and all three of a light violet hue, besides other differences of plumage; all these from Brazil; *C. affinis*, from Bogota, very like the preceding, which it exceeds in size, with the bill broader and less compressed, and many differences of colouring. (Langer) The vascular system of the Anodontes: Section II.—p. 150-152. PHYSIOLOGY. (Szontagh) On the minute Anatomy of the human jawbone—p. 3-9. (Engel) The development of the human hand; with two plates—p. 261-273. BOTANY. (Stur) The influence of the soil on the Distribution of Plants: a contribution to the Flora of Austria, and the Geography and History of the Vegetable kingdom—p. 71-149. Includes a Catalogue of the wild plants collected by the author in his travels through Austria, Hungary, Salzburg, Styria, Caryntha, Tirol, Carniola, Dalmatia, and the Venetian territory, with notes of the Geological positions. GEOLOGY, &c. (Hochstetter) On the position of the Hotsprings of Carlsbad, in two parallel series, on two parallel fissures of rock; with a plate—p. 13-36. (Hoernes) On Gastropoda from the Trias of the Alps—p. 68-70. (Woehler) On the Meteoric iron of Toluca in Mexico—p. 217-224. (Stur) Notice of the Geological map of the Neogene-tertiary, Diluvial and Alluvial deposits, in the district of the North-Eastern Alps, of Austria, Salzburg, Caryntha, Styria, and Tirol, &c.—p. 274-281. MISCELLANEOUS. (Moser) On the composition of the mud of the river Nile—p. 9-12. (Scherzer) Report on a Scientific Expedition to America during the years 1852, 1853, 1854, and 1855—p. 43-67.

JAHRBUCH DER K. K. GEOLOGISCHEN REICHSANSTALT. ANNALS OF THE IMPERIAL GEOLOGICAL INSTITUTE. 4to. Vienna.

Vol. VI. for the year 1855. No. 2, 3, 4.

(Andræ) Report on the results of official Geognostical examinations in Styria, during the summer of 1854—p. 265-304. (Emmrich) Contributions to the history of the Molasse of Southern Bavaria—p. 433-444. (Same) Notes on the Mountain limestone of the district of Lienz—p. 444-450. (Haidinger) Remarks on Pick's Considerations on the certainty of barometrical measurements of altitude—p. 450-453. (Same) Biographical memoir of J. Czjzek—p. 665-681. (Hauch) Results of a physico-chemical examination of the mineral springs of Szliacs, in Northern Hungary—p. 314-318. (Hauer) Report on the Geological operations of Section IV., during the summer of 1855—p. 741-749. (Same) The quicksilver deposit of Gagliano, in the province Udine—p. 810-814.

(Hochstetter) Geognostical studies of the Bohemian Forest: Part IV.—p. 749-810. (Hohenegger) Additions to the Geology of the Northern Carpathians, Paleontological—p. 304 312. (Jokely) Geognostical data concerning a portion of Central Bohemia—p. 355-404. (Same) Geognostical structure of the region of Mirotitz, Chlumetz, and Strepsko, in Bohemia—p. 682-741. (Kleszczynski) Geognostical sketch of the environs of Pribram—p. 254 263. (Koristka) New tables for the expeditious calculation of barometrical data of altitude—p. 837-842. (Kudernatsch) Contributions to the Geognosy of the mountain range of the Bannat—p. 219-253. (Lidl) Contributions to the Geognosy of S. W. Bohemia; with a plate—p. 580-619. (Lipold) Remarks on Münichsdorfer's description of the Hüttenberg mining district—p. 643-650. (Münichsdorfer) Geological positions of the metalliferous beds of Hüttenberg, in Carynthia—p. 619-643. (Peters) Notice of a skeleton of the gigantic deer of Ireland, *Cervus megaceros;* with a figure—p. 318-328. The author here discusses the reasons which have been alleged for supposing the gigantic deer to have been coeval with mankind, and pronounces them insufficient. A list is given of localities in the Austrian empire where the remains of the species have occurred, and of the Museums which contain tolerably perfect skeletons of it. Singularly enough, he has been uninformed as to the one which possesses the most complete and interesting collection of such remains. The Museum of the Dublin University contains three skeletons, two adult males and a female. These skeletons are very nearly perfect, being furnished with all the small bones and the incisor teeth; only a few pieces of the tail being deficient. The female is very elegant, the lightness of the cervical vertebræ and the slender limbs presenting a marked contrast to the males. This is supposed to be the only skeleton of the female that has been preserved in any tolerable condition. Besides the skeletons, the Museum possesses six sets of horns, in a series from an early age up to the maximum growth; a very fine small head, with short horns, and a beautifully perfect set of teeth; also the individual skull which has given rise to so much discussion, having been represented as fractured by human agency. It seems most reasonable to suppose that the orifice in question was produced by the wrenching off the horns, probably when the skull was first disturbed from its position as it lay embedded in the marsh. (Same) Report of the Geological operations in Carynthia, during the year 1856—p. 508-580. (Prinzinger) Geological notes of the environs of the Salt Mine of Hall in the Tyrol—p. 328-350. (Rolle) On some new localities of Foraminifera, Bryozoa, and Ostracodea, in the tertiary strata of Styria—p. 351-354. (Schefczik) On the motions of the floating crystals of some organic acids—p. 263, 264. (Stur) The Gross-Glockner and the ascent of it—p. 814-837. (Urban) On the basalt of Silesia—p. 312-314. (Wolf) Barometrical measurements of altitude in the Circle of Inn, U. Austria—p. 842-850. (Zepharovich) Contributions to the Geology of the Circle of Pilsen, in Bohemia; Part II.—p. 453-508. Operations of the Chemical Laboratory—p. 650, 651, 850-855. Proceedings. Lists of objects received, &c.—p. 405-432, 651-664, 855-976. List of Corresponding Members—pp. 6. Index—pp. 52.

Zeitschrift der Deutschen Geologischen Gesellschaft. Journal of the German Geological Society. 8vo. Berlin.

Vol. VIII. Parts 2 and 3; with fifteen Plates. 1855.

(Bornemann) The Microscopical Fauna of the Septarian Clay of Hermsdorf, near Berlin; with ten plates—p. 307-371. (Fallou) On the patches of Serpentine, in the Granulite of Waldheim, exposed by the Chemnitz Railway cuttings; with a plate—p. 399-405, 443, 444. (Hensel) Contributions to the Study of fossil Mammalia: the Insectivora and Rodentia of the Diluvial strata; with a plate—p. 458-501. (Liebe) The Zechstein of the principality Reuss-Gera; with a plate and map—p. 406-437. (Maschke) Preliminary Notes on Hydro-Silicate, and the formation of Opal and Quarz—p. 438-442. (Pfuel) Stratification of seams of Lignite, at Jahnsfeld and Marxdorf, West and S.W. of

Muencheberg—p. 372-376. (Richter) Contents of the Zechstein of Thuringia; with a plate—p. 526-533. (Roemer) The older strata in the neighbourhood of Aix, illustrated by comparison with the Geology of the South of Belgium—p. 377-398. (Same) Observations on the chalk formation of the neighbourhood of Aix, from researches in 1853—p. 534-546. (Saint-Claire-Deville) On the Eruption of Vesuvius on the 1st of May, 1855; Extract from Comptes Rendus de l'Acad. Fr.—p. 511-525. (Strombeck) On the Geological Antiquity of Belemnitella mucronata and quadrata—p. 502-510.

Neues Jahrbuch fuer Mineralogie Geognosie u. s. w. New Annals of Mineralogy, Geognosy, Geology, and Paleontology. 8vo. Stuttgart. 1855. Parts VI. and VII.

Original Communications. (Quenstedt) On *Eugeniacrinites caryophyllatus*; with two woodcuts—p. 669-673. (Vogel, A., Jun.) Analysis of some Minerals, Arsenical and Hydrated Pyrites—p. 674 676. (Weiss) Fundamental principles of Mechanical Geology. Part IV.—p. 769-794. (Deiche) On a singular position of Fossils in the Marine Molasse of East Switzerland—p. 795-797. Signalizing the occurrence of boring Mollusca, not only in calcareous rocks, but in the Zechstein and Sandstone. See next page, for a notice of Cailliaud's essay on boring Mollusca, in the Transactions of the Haarlem Society. (Jentzsch) Third Appendix to his Essay upon Amygdalophyr, and its characteristic Minerals, Chlorophanerite and Weissigite—p. 798-805. Correspondence—p. 677-681, 806-809. Literary Notices and Extracts—p. 682-768, 810-878.

Volume for 1856. Part I-V.

(Posselt) The Copper region of Lake Superior—p. 1-10. (Wiser) Report on the Minerals of Switzerland in his collection—p. 11-18. (Kauss) On a perfect jaw of *Halitherium* with teeth; with a plate and woodcuts—p. 19-21. (Gergens) On Crystallized Minerals imbedded in the Chalcedony of Oberstein—p. 22, 23. (Deicke) Geognostical sketch of the Lower Thurgau, and of the environs of Oeningen; with a woodcut—p. 129-134. (Gergens) On some Pseudomorphoses from the Lead mine of Kautenbach, near Berncastel, Mosel—p. 135-139. (Gastendyk) The district about Windingen, in the Principality of Waldeck; with a plate—p. 140-145. (Naumann) On the Crystalline order of Quartz according to Descloiseaux—p. 146-166. Not of the Rhomboedric, but a Tetartoedric order of the Hexagonal system. (Burkhart) On the position of the known masses of Meteoric iron in Mexico, and Remarks on the Origin and Composition of Aerolites; with a plate—p. 257-307. (Barrande) On the distinctive characters of the Nautilidæ, Goniatitidæ, and Ammonitidæ, and the new genus Nothocera; with a plate—p. 308-325. (Dieffenbach) Observations on the Mineral riches of the United States of North America; continued—p. 385-394. (Stifft) Chemical analysis of the Orthite of Weinheim in Baden—p. 395-397. (Leonhard) Artificial Graphite; a fragment from "The products of Metallurgy as the Fulcra of Geological Hypotheses"—p. 398-417. Pieces of ancient Roman pottery, dug up at Londiniéres in the dep. of the Lower Seine, were found blackened by a substance presenting the characters of black lead. From the circumstances in which the carbonaceous deposits occur in iron furnaces, the author concludes that they had been previously in a gaseous state, and points to the geological position of the Graphite of Borrowdale, in Cumberland, &c., as consistent with a similar origin. (Plaff) Critique of Weiss' "Fundamental Principles of Mechanical Geology"—p. 513-532. (Sandberger) Studies of the Tertiary formation of Mayence—p. 533-536. (Mæretins) The formation of Stalactites, in the Baumanns, and Bills-Hoehle, of the Bodethal, Harz—p. 537-541. Correspondence—p. 24-28, 166-173, 326-335, 418-423, 542-545. New Books—p. 29, 30, 174, 336, 337, 424, 546. Scientific Journals—p. 30-34, 174-179, 337-343, 425-430, 547-551. Reviews and Extracts—p. 35-128, 180-256, 344-384, 431-512, 552-610.

HOLLAND.

VERHANDELINGEN NATUURKUNDIGE VAN DE HOLLANDSCHE MAATSCHAPPIJ DER WETENSCHAPPEN TE HAARLEM. TRANSACTIONS OF THE DUTCH SCIENTIFIC SOCIETY OF HAARLEM. Second Series. 4to. Haarlem.

Part XI.; with three Plates. 1856.

(Cailliaud) On boring Mollusca; Prize Essay—pp. 58. Mr. Cailliaud has been witness of the complete act of rotation in *Pholas* perforating; which Mr. Robertson did not see in those observed by him. He considers the operation to be purely mechanical in this family, including *Xylophaga* and *Teredina*, and in *Teredo*, *Septaria*, *Fistulana gregata*, &c., and explains the application of the muscular force exerted. The other boring Mollusca, viz., all which have a proper ligament, bore by means of an acid, and only into calcareous rocks; *Saxicava*, *Petricola*, *Gastrochæna*, *Clavagella*, *Venerupis*, *Cypricardia*, *Byssomya*, *Lithodomus*. A similar acid appears to be present in all Mollusca, even the univalves, at least at certain seasons. From the number of boring Mollusca must be excluded several often included in the list, which merely occupy the forsaken burrows of the proper boring kinds; such are the species of *Fragilis*, *Pulastra*, *Rupicola*, *Venus*, *Arca*, *Corbula*, *Cardita*, *Galeomma*, *Ungulina*.

VERSLAGEN EN MEDEDEELINGEN DER KONINKLIJKE AKADEMIE VAN WETENSCHAPPEN. PROCEEDINGS, ETC., OF THE R. DUTCH ACADEMY OF SCIENCE, ETC. New Series. 8vo. Amsterdam.

Vol. II. Part III. 1854.

(Fremerij) Notice of a human skull dug up in the neighbourhood of Domburg, in the isle of Walcheren, Zealand; with a plate—p. 257–269.

Vol. III. Parts I. and II. 1855.

(Brants) On the image formed in the compound eye of Articulated animals, with reference to an observation of Gœttsche; with a plate—p. 1–14. (Gunning and Harting) Investigations of the origin of the Azote in plants, and the Ammoniacal contents of the Atmosphere—p. 38-60. (Mulder) From what source do plants, not manured, derive their Azote—p. 61-87. Concludes that the Azote of the atmosphere enters into the food of plants only through the medium of the soil. (Harting) Objections to the argument of Mulder, in the preceding paper—p. 88-91. (Staring) The subsidence of the ground in the Netherlands, geologically considered—p. 147-165. (Schlegel) On some new species of venomous Snakes from the Gold Coast—p. 312-317. Seven species of venomous snakes were observed along the coast between Cape Three Points and the Ford of Acra. *Naja rhombeata* is the most common species. The new species are, 1. *Vipera rhinoceros* (*Cerastes nasicornis*, Hallowell Proc. Ac. Philadelphia, iii. 319), distinguished from V. nasicornis by the single supranasal shield of each side, attenuated into a hornlike process, and the slightly carinated scales; the colours also are brighter, and the arrangement of the spots of the head different. 2. *V. chloroechis*, differing from the rest of the genus in general appearance, form of trunk and tail, and in the colour, and making an approach to the green Trigonocephali. A very rare native of Upper Guinea, where it ascends the shrubs in pursuit of birds and tree frogs.

HANDELINGEN DER NEDERLANDCSHE ENTOMOLOGISCHE VEREINIGING. TRANSACTIONS OF THE ENTOMOLOGICAL ASSOCIATION OF THE NETHERLANDS. 4to. Leiden. Vol. I. Part II. 1856.

The present part contains the report of two Annual Meetings of this Association, which counts above forty Members; the Tenth held at Haarlem, in August, 1854, the Eleventh at Arnhem, in August, 1855. As the state and progress of Entomology in Holland is less known than elsewhere, we notice more particularly the most important scientific communications contained in these Reports. Verloren gave some account of the oviposition and the eggs of *Panorpa communis*, the development of which has been more fully illustrated by Brauer (see the Transactions

of the Zoological and Botanical Association of Vienna); also of the nests of *Hydrophilus piceus*, which he had found in the great majority of instances composed by preference of the leaves of Polygonum amphibium. Eyndhoven noticed a second species of *Biorrhiza*, which also produces gall-like swellings of the radicles of the oak. Herklots exhibited drawings of the larva of *Anoncodes melanura;* the description of which we here extract, as it does not seem to have been known before:—The body is elongated, somewhat depressed. The head broad, quadrangular, scarcely half as long as broad; the antennæ inserted at the sides of the mouth, projecting straight forwards, composed of three joints, the first two cylindric, the second very long, the last joint much more slender, short, and setaceous; the eyes not distinguished, but they are probably placed in two dusky spots close by the insertion of the antennæ. The labrum semicircular, beset with hairs on the upper side and along the edge, corneous and brownish, with a transverse brown band in front of the clypeus. Mandibulæ stout, broad at the base, tapering quickly to a point, without teeth, but two-cornered under the point. Maxillæ more membranous, obliquely truncated above, pretty thickly set with short bristles along the inner margin, rounded at the back, broad, and furnished with a three-jointed palpus, the last joint of which is horny and brownish Labium long and narrow, somewhat contracted in the middle, then produced into a long point, at either side of which is inserted the palpus, of three joints, with the intermediate one very long, and the terminal minute and horny. The first segment of the trunk is as broad as the head, above produced backwards, divided in the middle, so as to form an obtuse rounded collar; the two following segments short; the rest as long as the second and third of the thorax conjointly, or even longer. The legs of moderate length, pretty stout, terminated by a sharp claw. The third and fourth abdominal segments are furnished beneath with a pair of strongly-developed tubercles, which are clothed at the end with short, rigid hairs. The last segment is somewhat turgid above, and covers the anus as with a sort of rim. The larva lives in old damp wood, in which it bores passages running rather irregularly lengthwise, with side galleries, and mostly filled with fibres of the wood and excrements. Vollenhoven gave an account of a specimen of *Canopus* — perhaps the Fabrician *obtectus*—furnished with wings; which fact seems to establish the validity of the genus, in opposition to the surmises of some late writers on the Hemiptera, that it was founded on larvæ only. Verloven detailed the results of some experiments, which prove unequivocally that the popular idea expressed in the name of Termes *pulsatorius* is correct, and that the ticking in old wood is really produced by this insect, and not by *Anobia* alone, as some authors have supposed—if, indeed, by the latter at all. Eyndhoven gave some additional particulars of the structure of the larvæ of *Dytiscus marginalis* and *Colymbetes striatus*. Van der Wulp pointed out a difference of venation which distinguishes *Bibio leucopterous* Mg. from *B. marci*, for a variety of which Loew was disposed to take it. The description of the female given here does not, however, agree perfectly with that by Mr. Haliday, at page 157 of the Entomological Magazine, Vol. I. Some fresh instances are noticed of gregarious flights of butterflies. Various additions to the Fauna of the Netherlands, in the Lepidoptera, Coleoptera, and Diptera, are recorded, and references given to Catalogues of the indigenous species of the two latter orders respectively.

BELGIUM.

Memoires Couronnes de l'Academie Royale des Sciences de Belgique, etc. Prize Essays of the Royal Belgian Academy of Sciences, etc. 4to. Brussels.

Vol. XXVII. A.D. 1855, 1856.

(Udekem) The development of *Lumbricus terrestris;* with a comparative view of that of Enchytreus, Tubifex rivulorum, Chætogaster diaphanus, and Nais proboscidea; with three plates—p. 1-75.

BULLETIN DE L'ACADEMIE R. DES SCIENCES DE BELGIQUE. BULLETIN OF THE R. BELGIAN ACADEMY OF SCIENCE. 8vo. Bruxelles.

Vol. XXII. Part II. A.D. 1855.

(Selys-Longchamps) Note on the Rufescent Swallow of Europe, *Hirundo rufula* Temm., and the other species of the subg. *Cecropis*—p. 95-134. (Wesmael) Ichneumonological Miscellanies—p. 362-435. A supplement to his various essays on the same family of insects, in the Bulletin and Memoirs of the Academy. Many new species are described, viz., of Ichneumon 26, Hoplismenus 1, Amblyteles 2, Eurylabus 1, Platylabus 1, Gnathoxys 1, Dicoelotus 1, Phaeogenes 8; some of which had been previously considered as varieties of known species. (Udekem) Two new species of Scolex, with a plate—p. 528-533. From the interior of Tubifex rivulorum and Nais proboscidea, respectively. (Same) Classification of the Annelida Setigera Abranchia; with a plate—p. 535-555. The following new species are characterized—Tubifex benedii, hyalinus, elongatus; Enchytreus ventriculosus; Dero obtusa; Nais appendiculata; Chætogaster muelleri. (Beneden) On the parasitic worms of the fish *Orthagoriscus mola*, and on the *Cecrops latreillii*, which lives attached to its gills; with a plate—p. 520-527. (Nyst) *Alderia scaldiana*, a new marine Mollusk of the shores of the Scheldt—p. 435-437. (Lacaze-Duthiers) Extract of a letter on the Hermaphroditism of the Anodontes—p. 504. (Strail) On a new species of Michelaria; reported on by Mr. Spring—p. 508—518.

Vol. XXIII. Part. I. A.D. 1856.

(Beneden) On the existence and characters of a third species of *Tænia* in man—p. 258. This Tænia, named *T. medio-cannelata* by Kuechenmeister, had been very generally supposed to be a T. solium that had lost its hooks; but an entire specimen recently voided, and yet living, having been brought to Mr. Van Beneden lately, he was enabled to assure himself of its specific distinctness, especially in the complete want of the rostellum, which is not liable to be lost, like some of the other organs wanting in this species. It appears, therefore, that the inference had been too hastily drawn that the older authors, who mention a Tænia without hooks in the human subject had in view the Bothriocephalus, which is known only in Switzerland, Poland, and Russia. Mr. Van Beneden also announced that Mr. Leuckart had succeeded in tracing the development of Cysticerci by means of artificial incubation. (Demoor) On the genus *Michelaria* of Dumortier—p. 357-366. Establishing, by the result of eight years' continued cultivation, the permanence of the characters of the plant in question, as a genuine species of Bromus, *B. arduennensis* Dumortier. (Spring and Kickx) Report on the preceding communication—p. 344-346. (Kickx) Essay on the indigenous varieties of *Fucus vesiculosus*—p. 477-526. (Bommer) Notice of Gagea spathacea, an addition to the Belgian Flora—p. 756. (Kickx) Report on the same—p. 736. (Ghaye) On the phosphorescence of snow—p. 256.

FRANCE.

MEMOIRES DE LA SOCIETE GEOLOGIQUE DE FRANCE. MEMOIRS OF THE GEOLOGICAL SOCIETY OF FRANCE. Second Series.

Vol. V. Part II. 4to. Paris. 1855.

(Terquem) Paleontology of the lower stage of the Lias formation of the Province of Luxemburg, and of Hettange, department of the Moselle; with fifteen plates—p. 216-343. This essay comprizes the animal remains; the new species described and figured amount to 130 Mollusca, 3 Annelida, 1 of Radiata, 1 of Polypi, 1 of Foraminifera. (Hébert) Sketch of the fossils of the chalk of Meudon, and descriptions of some new species; with three plates—p. 345-374. The new species are a fish, *Sphyrna plana*, 2 Annelida, 3 species of *Aptychus*, 3 Cephalopoda, 7 Gasteropoda.

MEMOIRES DE LA SOCIETE IMPERIALE DES SCIENCES DE LILLE. MEMOIRS OF THE SCIENTIFIC SOCIETY OF LILLE. Second Series. 8vo. Paris and Lille.

Vol. II. 1855.

(Macquart) Herbaceous plants of Europe and their Insects; third and concluding part—p. 253-407.

ARCHIVES DU MUSEUM D'HISTOIRE NATURELLE. ARCHIVES OF THE MUSEUM OF NATURAL HISTORY. 4to. Paris.

Vol. VIII. Part IV. A.D. 1856.

(Duméril) Description of new or imperfectly known Reptiles of the Collection of the Museum, and Remarks on the Classification of the Reptilia: Memoir II.; with eight plates—p. 437-588. The species figured entire, or in part, are Platydactylus trachygaster *Dum.* P. boivini, *n. sp.*; Hemidactylus baliolus *Dum.*; H. ateles, *n. sp.*; Sphærodactylus fantasticus *Cuv.* var.; Gymnodactylus elegans, *Gray*; G. arnouxii, *n. sp.*; G. coleonyx *Gray*; Stenodactylus caudicinctus *Dum.*; Laimanctes longipes *Wiegm.*; Anolis transversalis *Dum.*; A. heterodermus *Dum.*; Corytophanes percarinatus, *n. sp.*; Basiliscus galeritus *Dum.*; B. fasciatus *Wiegm.*; B. mitratus *Daud.*; Enyalis laticeps; *Ophryessoides n. g.*, distinguished from Ophryessa by the smaller size and subcylindric form of the tail, the absence of folds under the throat, and the greater size of all the scales, especially those of the head, O. tricristatus, *n. sp.*, from Brazil, length 6¾ inches, of which the tail makes five-eighths; Leiosaurus collaris *Say.*; L. bellii *Dum.*; *Sauromalus*, n. g., of singularly depressed form, differing from Diplolæmus by the lateral folds of the neck and flanks, the greater proportional length of the head and tail, and by the presence of denticulations on the anterior edge of the ear, and of pores on the inner face of the femora; S. ater. *n. sp.*, of which the origin is unknown; Holotropis trachycephalus *Dum.*; *Phymatolepis*, n. g., distinguished from all the other groups of Iguanini Pleurodontes by the tubercular character of the scales; P. bicarinatus, *n. sp.*, from Mexico; Centrura flagellifera *Bell*; C. quadrimaculata *Dum.*; Mecolepis trispinosus *Dum.*; M. hirsutus *Dum.*; M. sulcatus *Dum.*

Vol. IX. Parts I, II. A.D. 1856.

(Weddell) Monograph of the Urticeæ; with four plates—p. 1-200. The family is divided into five tribes, Ureræ, Procrideæ, Bœhmerieæ, Parietarieæ, Forskahleæ. The present part contains the Ureræ, with the genera *Urtica*, 51 species; *Obetia*, 2 spp.; *Fleurya*, 11 spp.; *Laportea*, 17 spp.; *Urera*, 17 spp.; *Girardinia*, 6 species; and of the Procrideæ, g. *Pilea*, with 35 species. Among the rest is figured the gigantic nettle of Australia, *Laportea gigas*, a tree which attains the height of one hundred and eighty feet in the woods of Illawarra.

SWITZERLAND.

MEMOIRES DE L'INSTITUT NATIONAL GENEVOIS. MEMOIRS OF THE GENEVESE NATIONAL INSTITUTE. 4to. Geneva. Vol. III. 1855.

(Mortillet) Prodromus of a new Geology of Savoy; with a plate—pp. 47. (Moulinié) Summary of the Embryology of Internal parasitic Trematodea; with seven plates—pp. 279. The kinds most largely illustrated here, from original observations, are *Distomum lanceolatum*, and the Sporocysts and Cercariæ found in Limax cinerea and rufa.

BULLETIN DE L'INSTITUT NATIONAL GENEVOIS. BULLETIN OF THE GENEVESE NATIONAL INSTITUTE. 8vo. Geneva.

Vol. I. A.D. 1853, 1854.

(Mayer) On Necrosis of bones—p. 200. (Vogt) On the penetration of the egg by Zoospermia—p. 223. (Mortillet) Catalogue of the Mammalia found about Genoa—p. 109. (Same) Description of the species of shells collected by Mr. Huet in Armenia, and considerations of Malacostatics—p. 36. New species,

Helix translucida, dumont; Bulinus tetrodon, cespitum; Clausilia huet, rupicola, disjuncta. (Vogt) Siphonophora of the Mediterranean sea—p.15-24. (Same) Anatomy of Salpa—p. 226. (Moulinié) Embryogeny of Trematodea—p. 465. (Michaud) On the relation between the botanical character of plants and the terrestrial and atmospheric influences under which they grow—p. 471. (Thurey) On the development of the leaves of plants, preceded by thoughts on the history of vegetable Organogenesis—p. 25-31. (Same) Inquiry as to the absorption by plants of water from the soil in a state of vapour—p. 106. (Same) The question, what is Species in Botany—p. 207-223. (Same) On the origin of the stipules of Phyllodendron—p. 108. (Same) Influence of vegetation on the formation of rocks at the present period—p. 31. (Mortillet) Geological observations on the coal measures of Pernant in Savoy—p. 101-106. (Same) On the vertical strata of Salève —p. 201. (Same) Discoveries made in the peat mosses of Savoy—p. 471.

Vol. II. 1855.

(Theobald) Letter, on a fall of black snow at Coir, in the Grisons, in February, 1855—p. 293. The colour of the snow was owing to the presence of vast numbers of a species of Podurellæ, of the genus *Desoria*, and, perhaps, not distinct from *D. glacialis* Nicolet. (Vogt) Report on Gegenbaur's recent publications on the Anatomy and Development of the Pteropoda and Heteropoda—p. 296. (Thury) On the cause of the diseases which have affected so many plants of late years; with reference especially to the disease of the grape and the potato—p. 298-308.

Vol. IV. 1856.

(Theobald) Influence of vegetation on the formation of recent rocks—p. 5-28. (Thury) Plan of a new Flora of Switzerland—p. 28-62.

Vol. III. contains no article Natural History.

Bulletin de la Societe Vaudoise des Sciences Naturelles. Bulletin of the Vaudois Society of the Natural Sciences.—8vo., Lausanne.

Vol. IV., No. 36, 37. A.D. 1855, 1856.

(Blanchet) On the production of light in glowworms—p. 430-437. (Chavannes) On the silk-producing Saturniæ, and their introduction into Europe as a branch of industry—p. 325-333. Besides the common silkworm of the mulberry, Asia produces many other kinds, the silk of which is of value for clothing, in particular S. atlas, cynthia, mylitta, pernyi, which will feed on the oak of Europe, assamensis; there are other Asiatic species probably worthy of attention also, S. perroteti, selene, leto. In Africa more than thirty species are known, but the cultivation of silk has not been pursued by its barbarous tribes. The most promising are S. cometes, mimosæ, bauhiniæ, vacuna, paphia, cytherea. The South American species, all of them distinguished by four hyaline spots on the wings, S. aurora, ethra, speculum, augias, encelades, afford silk valuable both for quantity and quality. Central America has S. orbigniana, and Cuba a species allied to S. speculum. The North American species are S. promethea, cecropia, polyphemus, luna. Australia has S. helena and janetta. The silk of the European native kinds, S. spini, carpini, pruni, is so inferior, that they do not deserve cultivation; but there is little doubt that some of the Asiatic species might be introduced with advantage, as the S. mori has been for many centuries. (Same) Report on the first attempt at the introduction of *S. mylitta*, in Switzerland—p. 416-419. (Yersin) On the last moult of the Orthoptera: with figures—p. 311-314. The wings afford a sure means of distinguishing the perfect state, for even when merely rudimental, they present the fan-like folds in this stage, which are wanting in the previous ones. (Same) Note on *Xiphidium fuscum*; with figures—p. 314-316. (DelaHarpe) Report on the returns concerning the destruction of the caterpillar of the vine, within the canton, in 1856—p. 284 296. (Briggs) On the first appearance and the spread of *Anacharis alsinastrum* in

England; translated, with notes by Gaudin—p. 281. (Davail) On the growth of wood—p. 399-402. (Blanchet) The fossil Flora of the Anthraciferous formation of the Alps—p. 322. The fossil Flora of Lausanne; I. The characters of the strata, by DelaHarpe—p. 346-352. II. General remarks and list of species, by Gaudin—p. 352-364, 422-436. (Chavannes) Note on the Siderolitic formation of Chamblon near Yverdon—p. 311. (Same) On a section of an Alluvial deposit near Renens, in the neighbourhood of Lausanne—p. 324. (Gaudin and DelaHarpe) Further particulars as to the Fossil bones of the Eocene period, in quarries of the Siderolitic formation of the Mauremont—p. 402. (Renevier) Fossils from the chalk of Spain, corresponding to those of the Rhodanian beds in Switzerland—p. 280. (Same) Summary of the researches of Mr. Sharpe on the cleavage and lamellar structure of rocks—p. 379-388. (DelaHarpe) The Kimmeridge coal of the Lower Valais—p. 304-310. (DelaHarpe and Renevier) Geological excursion to the Dent-du-Midi, Lower Valais; with a plate—p. 261-278. (Yersin) Note on the "Seiches," sudden oscillations of the water level in the lake of Geneva—p. 411. (Blanchet) Note on a complaint of the white wines of the vintage 1854—p. 414-416. Proceedings—p. 247-260, 335-346.

ITALY.

Memoires de l'Academie Royale de Savoie. Memoirs of the Royal Academy of Savoy. Second Series. 8vo. Chambéry.

Vol. II. A.D. 1854.

(Huguenin) Note on the Phanerogamous plants exclusively attached to the neighbourhood of human habitations—p. 235-240. (Same) Note on some Rare Plants observed in Savoy—p. 409 414. (Vallet) Note on the boring Mollusca of the basin of Chambéry—p. 323-329. (Pillet) Essay on Pluvial Erosion observed in the basin of Aix in Savoy—p. 331-353. (Same and Girod) Geological Memoir on the Commune of Chanaz; with a geological map—p. 355-384. (Vallet) On the white chalk of the environs of Chambéry—p. 385-402.

Memorie della Reale Accademia delle Scienze di Torino. Memoirs of the Turin R. Academy of Science. New Series. Physical and Mathematical Science. 4to. Turin. Vol. XIV. A.D. 1855.

(Studiati) Miscellaneous observations of Comparative Anatomy: I. On the cause of the change of colour in the skin of *Chamæleo africanus*, with two plates—p. 89-93. II. On the development of feathers; with a plate—p. 93-101. III. On the connexion of the egg with the oviduct in *Seps tridactylus*; with a plate—p. 101-113. (Bellardi) Classified Catalogue of the Nummulitic fossils of Egypt, in the collection of the Royal Mineralogical Museum of Turin; with three plates—p. 171-202. The list comprises 132 species, of which 99 are named determinately. The new species figured are—Bulla laevissima, clotbeyi; Natica longa; Bulimus osiridis; Rostellaria? planulata, digona; Sigaretus amplus; Fusus goniophorus; Nerinea serapidis; Ampullaria subcarinata; Cassis niloticus; Fusus ægyptiacus; Rostellaria apisidis; Clavagella grandis; Solen uniradiatus; Thracia costata; Arcopagia reticulata; Lucina ægyptiaca, bialata; Astarte longa; Lucina inflata, pharaonis, apisidis, cycloidea, osiridis; Ostrea clotbeyi, subarmata; Balanus ægyptiacus; Plicatula polymorpha. (Philippi) On the Propagation of the Trematodea, with two plates—p. 331-358. The development of various species of Cercaria into Distoma proved experimentally. (Tozzetti) Examination of the husk of the seeds of various plants; with four plates—p. 359-443.

Memorie dell' Accademia delle Scienze dell' Istituto di Bologna. Memoirs of the Academy of Sciences of Bologna. 4to. Bologna.

Vol. V. 1854.

Zoology. (Bianconi) Zoological specimens from Mozambique: Part VII.; with two plates—p. 225-243. *Cynopterus marginatus* Cuv. F., and *Nyctinomus tenuis* Horsf. (Dysopes,—*N. plicatus* Gray?) described and figured. (Calori) On

the structure of *Helamys caffer* Cuv.; with four plates—p. 245-313. Physiology. (Paolini) On a special mode of Reflected action, peculiar to the sensory nerves—p. 391-404. (Giacomelli) Anatomical description of a monster destitute of hind extremities; with three plates—p. 25-40. (Calori) Anatomical description of a human monster, peracephalous; with two plates—p. 433-505. Botany. (Bertoloni, Antonio) Botanical Miscellanies: Part XV.; with four plates—p. 423-443. An essay on the Golden Apples of the Hesperides, the fruit of the *Citrus deliciosa* Franzoni, a species indigenous to Morocco. New species of plants from Alabama, U. S., viz., *Potamogeton delicatulum* (P. heterophyllum *Torreys*, but not the same as the European plant of that name); *Convolvulus condensatus; Gentiana gracillima; Hibiscus trisectus; Polygala pseudosenega*, *Marshallia dentata*. (Bertoloni, Giuseppe) Illustrations of the Plants of Mozambique; Essay IV.; with six plates—p. 463-483. The following new species are described and figured, *Cyperus caffer; Mariscus piluliferus; Xanthoxylon terebinthoides; Scleria coriacea; Brideiia cathartica*, which affords a purgative drug known to the Kaffirs as Mangandogia, the name also applied to the plant. (Sgarzi) Chemical examination of the plant *Chibaca salutaris* Bert., from which the natives of Mozambique obtain a valuable remedy for Angina gangrænosa—p. 58-79.

Vol. VI. 1855.

Physiology. (Calori) Description of a human monster; preceded by a short essay on the eggs of birds containing a double germ; with three plates—p. 171-238. Zoology. (Bianconi) Zoological specimens from Mozambique: Part VIII.; with three plates—p. 139-152. New species of fishes described and figured —*Amphisile punctulata* (perhaps a variety of *A. scutata*); *Diodon calori; Tetrodon hartlaubii, petersii; Monacanthus bertolonii; Ostracion fornasinii*, described in vol. V., A.D. 1846, is also figured. (Alessandrini) Observations on the Anatomy of the Agouti, *Chloromys Acuti*; with three plates—p. 153-170. (Bertoloni, G.) Illustrations of the Natural productions of Mozambique: Essay V.: Coleoptera; with two plates—p. 419-446. The new species described and figured are—Lamellicornia, *Ranzania splendens (Dicranorrhina)*; *Onitis gigas*; Melasoma, *Hcteroscelis savii*; Curculionidæ, *Cryptorrhynchus ebeni*, in the pods of the native ebony tree, Fornasinia ebenifera; Longicornia, *Hammaticherus serraticornis; Oberea alessandri*. Botany. (Bianconi) Examination of the tendrils of the Cucurbitaceæ; with three plates—p. 287-308. (Bertoloni, A.) Botanical Miscellanies: Part XVI.; with five plates—p. 447-474. A list of the plants of Mount Cornoviglia; *Grimmia longipila* n. sp. (*G. funalis* var β., Notaris.) New species from Alabama, U.S., *Myriophyllum fulvescens; Pinus serotina; Acacia multifoliata*. Geology, &c. (Garzi) Analysis of an Aerolite which fell on the 8th of May, 1846, in the district of Monte Leone, near Macerata—p. 89-111. (Same) Thoughts on the petrifaction of wood—p. 475-497. (Santagata) On the earth interposed among the crystals of Gypsum—p. 13-120. (Same) On the origin of the scaly Clays—p. 499-532. His observations lead him to conclude that they afford an instance of the complete Metamorphose, chemical and mineralogical, of various sedimentary rocks. (Same) On the efflorescent Salts of the clays of Biscano and Pasterno—p. 533-552.

BRITAIN.

Edinburgh New Philosophical Journal; exhibiting a View of the Progressive Discoveries and Improvements in the Sciences and Arts. Edited by Thomas Anderson, M.D., Sir W. Jardine, Bart., and T. H. Balfour, M.D. No. 8. October, 1856: to be continued quarterly. 8vo. Price 6s.; with four Plates.

Original Communications—(John Martin) On the Northern Drift as it is developed on the Southern shore of the Moray Frith. (Rev. W. S. Symonds) On the Transition Beds from the Upper Silurian into the Old Red Sandstone, and from the Old Red Sandstone into the Carboniferous Rocks in Herefordshire and Gloucestershire. (R Russell) Some remarks on the Storm of 6th and 7th February, 1856. (Alexander Smith, M.D.) On the preparation of Sugar and Arrack

from Palms in Ceylon. (M. Camille Dareste) On the animalcules and other organised bodies which give a red colour to the sea. (Andrew Murray) Description of a new species of Echeneis (E. tropicus), and of a new Lernean of the genus Penella (P. remoræ) infecting the Echeneis remora, with some remarks on the economy of the Remora. (W. B. Rogers) On the Discovery of Paradoxides in the altered rocks of Eastern Massachusetts. (R. Harkness and John Blyth, M.D.) On the Lignites of the Giants' Causeway, and the Isle of Mull. (T. Strethill Wright, M.D.) Description of two Tubicolar animals, and on the existence of Thread-cells in the tentacles of Cydippe. (H. C. Sorby) On the Terraces in the valley of the Tay, north of Dunkeld. Reviews, Proceedings of Societies, and Scientific Intelligence. This number contains four plates, and Title-page and Index to Volume IV.

Quarterly Journal of Microscopical Science. No. 17, October, 1856. Price 4s. With Woodcuts and Lithographic Illustrations. 8vo. London: John Churchill.

(W. Gregory, M.D.) On the Post-tertiary Diatomaceous Sand of Glenshira. Pt. II., containing an account of a number of additional undescribed species. (R. J. Farrants) A Micrometer object-finder. Report of the Committee appointed by the Microscopical Society for the purpose of ascertaining the most convenient form of finder for indicating the position of objects under the Microscope—the point from which the distance of objects must be taken has been fixed on as the centre of the slides—which are, or at least always ought to be 3 inches by one—this at once gives the starting point for an universal system of measurement. And we think the details which the Committee give in this paper would be easily carried into execution by any optician. The Finder they recommend is alike adapted to Microscopes with or without stage movements. (N. F. Davy) Brief remarks upon Cell-growth in the Bryonia dioica. (Hon. and Rev. S. G. Osborne) Vegetable Cell-structure and its formation, as seen in the early stages of the growth of the wheat plant. (Thos. Dobson, A.B., Hobart Town) On Laap or Lerp, the cup-like coverings of Psyllidæ found on the leaves of certain Eucalypti—communicated by George Busk. Original Communications—(J. Hepworth) The Practical use of the Microscope. (W. Smith, F.L.S., &c.) Notes of a Microscopical Examination of "Measled" and other Pork. (R. K. Greville, LL.D.) Description of some New Diatomaceous Forms from the West Indies. Reviews.—Notes and Correspondence. Proceedings of Societies. Zoophytology; with plates XIII. and XIV., and five plates illustrative of the Transactions, and one of the "Journal."

The Annals and Magazine of Natural History; including Zoology, Botany, and Geology. No. 106, October; No. 107, November; No. 108, December. With Plates. London: Taylor and Francis.

No. 106, October. (Rev. W. A. Leighton, A.B.) Monograph of the British Umbilicariae. (August Muller) On the development of the Lampreys. (Andrew Murray) Monograph of the genus Catops. (N. Lieberkuhn) Contributions to the anatomy of the Infusoria. (Rev. W. A. Leighton, B.A.) New British Arthoniae, with a plate. Proceedings of Learned Societies—Royal Botanical of Edinburgh, and Zoological. Miscellaneous—William Yarrell. Amphioxus lanceolatus, by W. P. Cocks. (P. L. Sclater) On a new Tanager. Meteorological table and observations for August, 1856.

No. 107, November:—(Joshua Alder) A Notice of some New Genera and Species of British Hydroid Zoophytes, with three plates. (Dr. Alexander Braun, Professor of Botany in the University of Berlin) On the Vegetable Individual in its relation to species; translated by Chas. Francis Stone, B.A. (T. H. Stewart) On the young state of Ophiocoma rosula, and on the form and development of the spines of this species. (Andrew Murray) Monograph of the genus Catops. (Lieut.-Colonel Madden, F.R.S.E., President of the Botanical Society of Edinburgh) Elucidation of some Plants mentioned in Dr. Francis Hamilton's Account

of the Kingdom of Nepal. (Dr. J. E. Gray, F.R.S.) Notice of a New Subgenus of Helicinidæ. Proceedings of Learned Societies—Zoological Society—(Mr. S. P. Woodward) On Panopæa Aldrovandi. (Mr. P. L. Sclater) On two new species of Tanagers. (Dr. J. E. Gray) On the genus Assiminia. Miscellaneous—(W. H. Benson) On Clausilia Rolphii and Mortilleti. (Prof. J. W. Bailey) On the Origin of Greensand, and its formation in the Oceans of the present epoch. (Prof. Agassiz) On the Cumæ. (Frederick Townsend) Note on Callitriche hamulata. (W. P. Cocks) Rare British Birds. (Frederick Moore, Assist. Mus., East India Company) Descriptions of two new species of the genus Orthotomus. Meteorological Observations and Table.

No. 108, December:—(W. H. Benson) New Land Shells collected by E. L. Layard, Esq. (Joshua Alder) Descriptions of three new British Zoophytes, with a plate. (Lieut.-Colonel Madden, F.R.S.E., President of the Botanical Society of Edinburgh) Elucidation of some plants mentioned in Dr. Francis Hamilton's Account of the kingdom of Nepal. (Andrew Murray) Monograph of the genus Catops. (Dr. J. E. Gray, F.R.S., &c.) On the Abnormal Operculum of Polydonta elegans of New Zealand. (Rev. Thomas Hincks, B.A.) Note on Reticularia immersa, and Halia prætenuis. (J. Gwyn Jeffreys, F.R.S.) Contribution to the Conchology of France. Bibliographical Notices—(The late W. A. Bromfield, M.D., &c.) Flora Vectensis, being a systematic Description of the Phænogamus or Flowering Plants and Ferns indigenous to the Isle of Wight. Edited by Sir William J. Hooker and T. Bell Salter, M.D. (C. F. Nyman) Sylloge Floræ Europææ seu plantarum vascularium Europæ indigenarum enumeratio, adjectis synonymis gravioribus et indicata singularum distributione geographica. Proceedings of Learned Societies—Zoological Society—(Mr. A. White) On some Coleopterous Insects. (Mr. G. R. Gray) On a new species of Pigeon, and on a new species of Lepidopterous Insect. Royal Society—(Mr. G. Rainey) On the structure and development of the Cysticercus cellulosæ, as found in the pig. Miscellaneous—(H. Muller) Observations on the structure of the Retina in certain animals. (William Thompson) Remarks on Nika Edulis, Risso. (W. P. Cocks) Note on the occurrence of Naucrates ductor. (Prof. Kolliker) On peculiar and Quasi-spontaneous movements of the Plasmatic Cells of certain animals. (E. W. Holdsworth) Description of a new species of Actinia from the Devonshire Coast. Meteorological Observations and Table; Index, with Title-page, Contents, &c.

The Zoologist. No. 168, October; No. 169, November; No. 170, December, 1855. 8vo. London: John Van Voorst. Price 1s. each.

No. 168, October. Notices of New Books.—"Second Supplement to the History of British Birds; being also a first Supplement to the Second Edition." By William Yarrell, V.P.L.S., F.L.S. Birds—(Thomas Edward) A list of the Birds of Banffshire, accompanied with Anecdotes. (Rev. Alfred Charles Smith, M.A.) Ornithology of Switzerland. (J. Reuben Baker) Nidification of the Honey Buzzard in the New Forest. (Edward Hearle Rodd) Occurrence of Montagu's Harrier, near Penryn, Cornwall. (H. Stevenson) Extraordinary Varieties of the Common Nightjar. (William Thompson) Pheasant feeding on Ivy leaves. (Osbert Salvin) Occurrence of the Great Bustard in Cambridgeshire. (Capt. H. W. Hadfield) Little Crake in the Isle of Man. (George Wolley) Occurrence of the Avocet in Nottinghamshire. (Joseph Pease) Inquiry respecting the Sexes of Geese. (Samuel Gurney) Black Swans breeding in Confinement. Crustacea.—(R. Q. Couch) On Crustacea new to the British Fauna. (Alfred Merle Norman) Thesia Polita at the Isle of Herm; Hippolyte Spinus off Oban. Radiata—(Alfred Merle Norman) Note on Comatula rosacea.

No. 169, November. Insects—The "Zoologist" Abroad. (C. R. Bree, Rev. Joseph Greene, M.A., H. Harpur Crewe, M.A., Rev. Herbert Bree, M.A.)—Protest against Mr. Stainton's change of Names in the British Lepidoptera. (H. Harpur Crewe) The name of the "Substitute." (S. Gregson) Reply to some of Mr. Ashworth's Remarks in the "Zoologist." (G. R. Crotch) Extraordinary Abundance of Thecla Betulæ in Montgomeryshire. (Thomas Bell) Larva of

Cerura vinula. (H. Harpur Crewe, M.A.) Notodonta camelina double-brooded. (E. Shepherd) Double-broodedness of the Notodontæ. (Edward Newman) Descriptions of two Noctuina new to Britain. (Nicholas Cooke) Description of a British Noctua new to Science. (J. M'Laren) Economy of Halias Quercana. (C. S. Gregson) Descriptions of two British Tineadæ new to Science. (Arthur Adams, F.L.S., Surgeon of H.M. Surveying Ship "Actæon;" and William Balfour Baikie, M.D, F.R.G.S., Haslar Hospital) A systematic List of Coleoptera found in the vicinity of Alverstoke, South Hants. (J. J. Reading, Esq.) Carabus intricatus in Devonshire. (Rev. Hamlet Clark, M.A.) Note on Localities for Agabus brunneus and Hydroporus opatrinus. Proceedings of Societies.—Entomological Society of London. Quadrupeds—(John Joseph Briggs) Long-tailed Field-mouse. Birds—(Capt. C. W. Watkins) Ornithology of Andalusia. (Henry Smurthwaite) Notes on Birds in Germany. (Edward Hearle Rodd) Occurrence of the Honey Buzzard near Penzance. (Edward J. Tuck) Occurrence of the Rose-coloured Pastor and Hoopoe in Essex. (H. Stevenson) Occurrence of the Rose Pastor, Merlin, and Peregrine, in Norfolk. (Capt. H. W. Hadfield) Scarcity of the Song Thrush. (Arthur Woodroofe) A young Spoonbill shot at Shoreham. (H. B. Tristram) Pelican found dead on the Coast of Durham. (Alfred O. Walker) Occurrence of the Eared Grebe in Flintshire. (W. H. Slaney) Do Cuckoos take the Eggs of other Birds as Food? Mollusca, &c. (Rev. Alfred Merle Norman) Rissoa lactea in Jersey and the Isle of Herm; Limax Gagates in Scotland and Guernsey; Octopus vulgaris at Herm; Eurylepta vittata at Herm. Insects.—(J. M'Laren) Duration of Pupa state in Acherontia Atropos. (Rev. Arthur Hussey, M.A.) Larva of Stauropus Fagi on the South Downs of Sussex. (T. Thorncroft) Capture of Phlogophora empyrea, Agrotis saucia, and Phibalapteryx gemmaria at Brighton. (Edward Newman) Capture of Phlogophora empyrea near Lewes, &c. (Edwin Shepherd) Mr. Gregson's Pœcilochroma stabilana, a variety of P. sordidana—Mr. Stephens' P. stabilana equals P. Solandriana. (Thomas Ingall) Capture of Sphinctus serotinus of Gravenhorst. Notices of New Books.—"Annals and Magazine of Natural History."

No. 170, December:—Notices of New Books.—"Journal of the Proceedings of the Linnean Society," Parts II. and III. "The Natural History Review," No. XII. (William Kirby, M.A., F.R.S., F.L.S., Rector of Barham, and William Spence, Esq., F.R.S., F.L.S.) "An Introduction to Entomology; or, Elements of the Natural History of Insects," comprising an account of noxious and useful insects, &c. Seventh Edition, with an Appendix relative to the Origin and Progress of the Work. (W. S. Dallas, F.L.S.) "A Natural History of the Animal Kingdom, being a systematic and Popular Description of the Habits, Structure, and Classification of Animals." (Philip Henry Gosse, F.R.S.) Part II.: "A Manual of Marine Zoology for the British Isles." (Rev. George Tugwell) "A Manual of the Sea Anemones commonly found on the English Coast." (Philip Henry Gosse, F.R.S.) "Tenby: a Sea-side Holiday." (Capt. C. W. Watkins) Corrections of Errors. Errata.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 93, October; No. 94, November; No. 95, December, 1856. 8vo. London: Lovell Reeve. Price 2s. each, with a Plate.

No. 93, October:—Original Papers—(Lowe, R. T.) Species Plantarum Maderensium. (De Vriese, Dr.) On the Transplantation of the Peruvian Bark-tree into the Dutch East Indies. Botanical Information—The late Professor Bojer; The Soap-plant of California. Notices of Books—Tuckerman: Lichenes Americæ Septentrionalis Exsiccati.

No. 94, November:—Original Papers—(Mueller, Dr. F.) Observations on North Australian Botany. (Mueller, Dr. F.) Descriptions of rare or hitherto undescribed Australian Plants. (Mueller, Dr. F.) Account of the Gunyang, a new Indigenous Fruit of Victoria. (De Vriese, Dr.) On the Transplantation of the Peruvian Bark-tree into the Dutch East Indies. Botanical Information:—Cuba Bast. Jersey Cabbages. Algerian Plants. Schimper's Plantæ Abyssinicæ. Notices of Books—

Kew Gardens; a Popular Guide to the Royal Botanic Gardens of Kew; by Sir W. J. Hooker. Guide to the Museum of Economic Botany in the Royal Gardens of Kew; by Sir W. J. Hooker.

No. 96, December:—Original Papers—(Mitten, W.) Mosses and Hepaticæ collected at Moulmein. (Bentham, G.) Description of two American Species of Gnetum. (Hooker, Sir W. J.) On Polypodium anomalum, a new fern. (De Candolle, Alph.) Sketch of the Life and Writings of M. de Martius. On Papyrus, Bonapartea, and other plants which can furnish fibre for paper-pulp. On the cultivation of Rafflesia Arnoldi, R. Br.: a letter from Mr. J. E. Teysman. On the period of Leafing, Flowering, and Fruiting of Plants. (Thwaites, G. H. K.) Note on Dichilanthe Zeylanica. (Thwaites, G. H. K.) Note on the Genus Doona. Botanical Information—Valuable American Herbarium for sale. Odal Oil. Mueller's European Herbarium. Mr. Spruce's Collections. M. Huet de Pavillon's Plants of Sicily. Note on Stylosanthes, by G. Bentham. Notices of Books—Flora of Tasmania, by Dr. J. D. Hooker. Manual of the Botany of the United States, by Dr. Asa Gray.

Transactions of the Entomological Society of London. New Series, 8vo. London. Vol. IV. Part I., with twelve Plates, price 3s. 6d. Part II., with one Plate, price 2s. 1856.

(Westwood) Descriptions of the Species of the Australian Lamellicorn genus *Cryptodus*; with a plate—p. 1-7. Three new species are described and figured, viz., *C. tasmanianus* and *politus*, which enter into the subgenus *Cryptodinus* Westwood, along with C. passaloides *Germ*, and *C. caviceps*, constituting the subgenus *Cryptodellus* (Westwood). We cannot approve of subgenera named after this fashion, however "handy" it may seem. (Lubbock) On some Entomostraca collected by Dr. Sutherland, in the Atlantic Ocean; with eleven plates—p. 8-37. How imperfectly the marine Entomostraca are known as yet appears from the large proportion of new species introduced in this collection—twenty-three out of thirty-five. They are as follows,—Calanus inconspicuus, penicillatus, latus, brevicornis, mirabilis; Euchaeta atlantica, sutherlandii; Undina danae, longipes, plumosa, helenae, pulchra; Diaptomus dubius, abdominalis; Pontella setosa; Clytemnestra atlantica; Corycæus sutherlandii, styliferus; Copilia atlantica; Sapphirina danae, opaca, stylifera; Halocypris atlantica. (Stainton) How may the onward progress of Entomology be best furthered—p. 38-42. (Pascoe) Descriptions of New Genera and Species of Asiatic Longicorn Coleoptera; with a coloured plate—p. 42-48. Chiefly from the collections of Mr. Wallace in Malacca and Borneo; a few collected by Mr. Fortune in Northern China. Blemmya *n.g.*, B. whitei; bifasciata; Prothema *n.g.*, P. signata, funerea; Acrocyrta *n.g.*, A. clytoides; Astathes simulator n.sp.; Serixia *n.g.*; S. apicalis, modesta; Neoxantha *n.g.*, N. amicta; Entelopes wallacei, doubtful whether distinct from E. brevicollis *Dj.*; Dialeges *n.g.*, D. pauper; Triammatus chevrolati *n.sp.*; Monohammus luridus, aspersus, infelix, blattoides, *n.spp.* Proceedings—p. 1-16.

Journal of the Proceedings of the Linnean Society. 8vo. London. No. 3; with two Plates. November, 1856.

Zoology. (Walker) Catalogue of the Homopterous Insects collected at Singapore and Malacca by Mr. A. R. Wallace, with descriptions of new species, continued; with two plates—p. 97-100. (Couch) On the occurrence of Sepia biserialis in Cornwall—p. 100-102. (Westwood) Notice of the "Borer," a caterpillar very injurious to the Sugar cane in the island of Mauritius—p. 102. The moth appears to be identical with the *Phalæna saccharalis* Fabr., *Diatraea sacchari* Guilding, so destructive to the plantations of the West Indies. (Hanbury) Notice of a specimen of Insect-wax from China—p. 103. (Westwood) Note on Insects producing wax, from Port Natal and China—p.104. (Walker) Catalogue of the Dipterous Insects collected at Sarawak, Borneo, by Mr. A. R. Wallace, with descriptions of new species—p. 105-136. Of the total

number, one hundred and seventy, ninety-nine are described as new species. The following new genera are characterized—Stratiomidæ, *Culcua* and *Evaza*, the venation in both like that of Clitellaria, and the scutellum four-spined; Helomyzides, *Gauzania*. (Hicks) On a new organ in Insects; with a plate—p. 136-140. A peculiar structure of the halteres of the Diptera is described, consisting in microscopic vesicles arranged in rows, alternating with hairs. Similar appendages exist on the base of the subcostal, or costal nervure of the wings, both in this and the other orders. Considered in connection with the magnitude of the nerves which go to the base of the wings and halteres, this structure probably indicates an Organ of Sense, which Mr. Hicks is even disposed to think may be that of Smell. It seems to us, however, that the researches of Lehmann, Erichson, Burmeister, and others, into the minute structure of the antennæ of insects, as the probable seat of this sense, have deserved better than to be set aside so easily, by the learned author—with this aphorism, "the olfactory organ has never been decided on"—in favour of mere arbitrary conjectures.

Botany. (Bentham) On Loganiaceæ, concluded—p. 97-114. (Hooker, J. D.) On some collections of Arctic Plants, chiefly made on the Expeditions in search of Sir John Franklin—p. 114-124. (Same) Botany of Raoul Island, one of the Kermadee group in the S. Pacific—p. 125-129. New species described, *Coprosma petiolata, acutifolia; Asimina lanceolata*. (Gray, Asa) Note on *Obolaria virginica L.*—p. 129, 130. It is a true Gentianea, even in regard to the placentation, which was before considered as exceptional. The only anomaly is the imbricative (not convolutive) æstivation of its corolla. (Darwin) Action of seawater on the Germination of Seeds—p. 130-140. (Salter) Vitality of Seeds after prolonged Submersion in the Sea—p. 140-142. (Berkeley) Note on the development of Fungi upon Patna Opium—p. 143.

Journal of the Royal Dublin Society. Published quarterly. No. 1, April. No. 2, July. No. 3, October, 1856. Dublin: Hodges, Smith, & Co.

We are glad to see that the Dublin Society are determined to publish their proceedings in so convenient a form as this Journal; and we trust that the Council, to whom the management of the affairs of the Society is committed, will do everything in their power to assist the Editor in making it—what it ought to be—a fitting representative of such a scientific body. It has compeers in the Journals of the London and Edinburgh Royal Societies; and we hope it will soon equal either in importance.

We were not aware that the talented Editor had enlisted under the "Septenary" banner, but we find in each number exactly "seven" papers, and, to make up this number on the October cover, he publishes a communication made to the Society exactly thirty-six years ago.

No. 1, April—Among other papers, contains:—(Dr. Steele) On Chloride of Lime as a Preventive of Smut in Wheat. (Dr. Carte) Report of the Progress of the Museum of Natural History of the Royal Dublin Society for the year 1855; and an Account of the Ceremony of laying the Foundation Stone of the New Museum.

No. 2, July.—(Dr. Carte) Nidification of the Ivory Gull; with a Chart and Plate. (Dr. Kinahan) On the Guano Deposits of the Chinchas Islands, Peru—p. 89-100. (David Moore) The Mosses of Ireland—additions to. List of British Crustacea:—What is this list inserted in the Proceedings of the Society for? Is it to show that the Museum contains specimens of all the British Crustacea, except the desiderata given at the end of it? if so, the Museum is most fortunate. And if not, it is mere waste of money and paper. English names, too, are attached to some of the species—why not to all? Surely, there would have been no difficulty in "coining" some.

No. 3, October—(Dr. Kinahan) On the habits and distribution of the Marine Crustacea of Port Philip—p. 111-134; with two plates. Two new genera and five new species are described. (Mr. Griffith) Report relative to the Moving

Bog of Kilmaleady (with a map). Museum of Natural History—Lists of Irish Mammals, Reptiles, Amphibia, and Echinodermata. More Lists; and we really cannot see their value. On whose authority is Irish affixed to them? Are all the species given supposed to be indigenous? If so, what brings Sciurus Vulgaris among the Irish Mammals? but we see a ? attached to the specific name; so, perhaps, it is a new species peculiar to Ireland. Or are they lists of things captured in Ireland? if so, we miss Bufo Vulgaris, Vipera Communis, and such things—all taken alive in the country. These Lists will doubtless help to increase the debtor side of the Society accounts. In our opinion, they never will increase its credit side.

The Naturalist: a popular monthly Magazine, with numerous Engravings; conducted by Rev. F. O. Morris, B.A. No. 68, October. No. 69, November. No. 70, December. 1856. 8vo. Price 6d. each. London: Messrs. Groombridge.

No. 68, October:—(T. S.) A Visit to Refley Wood. (Frederick M. Burton) Extracts from Correspondence with a Brother Naturalist. (W. Sutherland) A Visit to Braemar, in 1855. (W.) Contributions to the Ichthyology of Banffshire. Miscellaneous Notices.—Anecdote of a Dog. Instinct of Animals. The Nightingale. Java Sparrow. Occurrence of the Rose-coloured Pastor. The Hoopoe. Notices of New Publications.—Jottings in Australia; being Notes on the Flora and Fauna of Victoria, with a Catalogue of the more common Plants, their Habitats, and time of Flowering, by Samuel Hannaford. Review.—Insecta Britannica—Diptera. Vol. III. By Francis Walker, F.L.S. London: Lovell Reeve. 1856. Retrospect.—Moth Hunting. On 'Change.—Botany. Peat Earth. Entomology. Proceedings of Societies.—London Working Entomologists' Club. Obituary.—Death of Mr. Yarrell.

No. 69, November:—(O. S. Round) The Flycatcher. (W. Sutherland) Visit to Braemar, in 1855. (Rev. R. P. Alington) A few words on commencing a Collection of Lepidoptera. (O. S. Round) Spring Walk. (Editor) A List of Sizes of Cases for Birds. (Editor) Systema Naturæ. (John Dutton) The Puffin. Miscellaneous Notices.—Stormy Petrel. Phalarope. Gray Phalarope. Ring Ouzel. Golden Plover. Green Sandpiper. Greenshanks. Swallows. Nightjar. Golden Orioles and Broadbilled Sandpiper in Norfolk. The Wryneck. Black-headed Gull. Another Capture of Carabus intricatus in Devonshire (with Engraving). The Shag. Little Gull. Note on the habits of Drypta. Early appearance of a Chrysalis. Exchange.—Dried Plants. Land and Fresh-water Shells. The Querist.—The "Naturalist's" Heraine.

No. 70, December:—(C. J. S.) Haunts of the Town Sparrow. (Lieut. Blakiston and Lieut. Bland) A List of the Birds of Nova Scotia. (Editor) A List of Sizes of Cases for Birds. (Rev. R. P. Alington) A Few Words on commencing a Collection of Lepidoptera (with Engravings). (Aurelius) On the Present Condition of the Classification of British Lepidoptera. (O. S. Round) Vacation Notes—Herne Bay. (Thomas Foggitt) A List of Epiphytes growing on the Willows in the Holmes, Thirsk. (Editor) Systema Naturæ. Miscellaneous Notices.—Stormy Petrel. Cream-coloured Courser. The Querist—Food of the Larvæ of Lithosia. Location of Chrysalides.

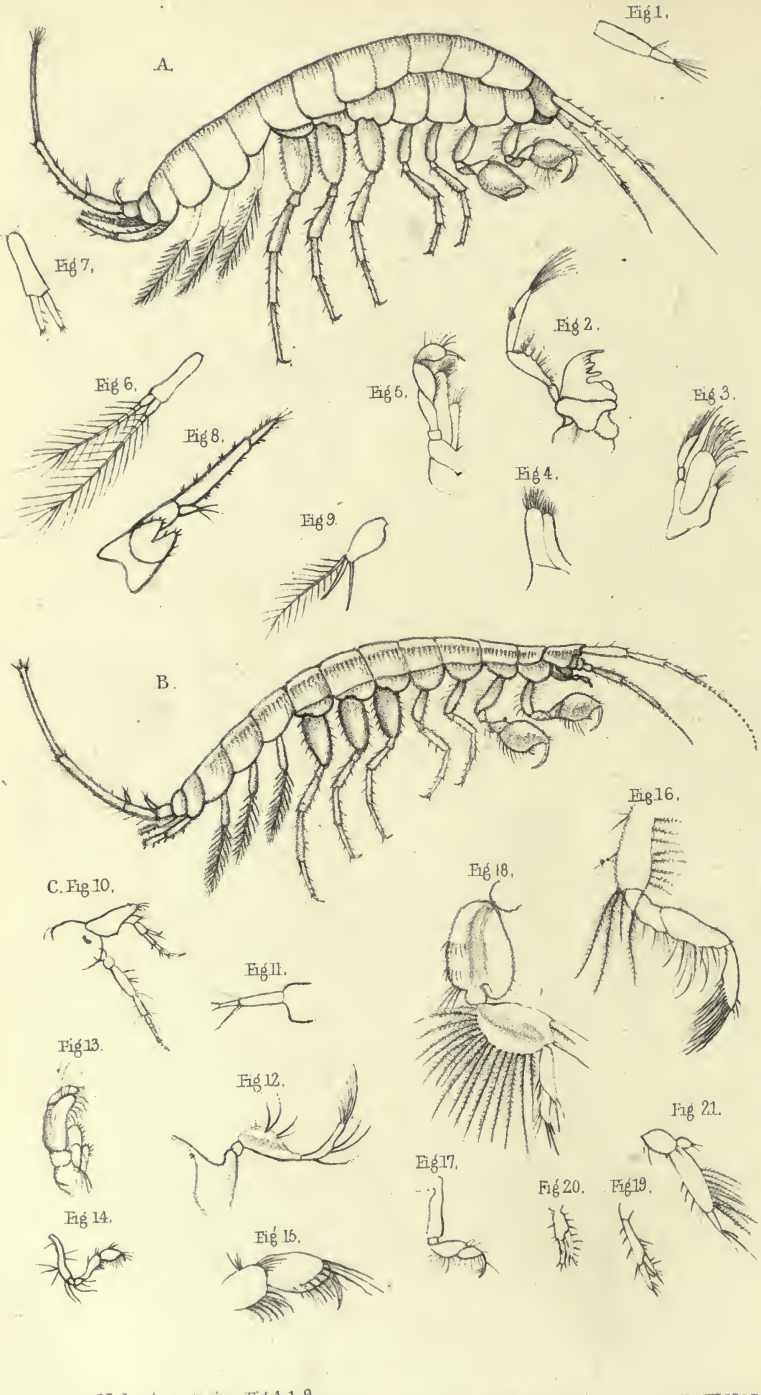
Transactions of the Royal Irish Academy. 4to. Dublin. Vol. XXII. Part I., Science. 1855.

(Allman) On the Homology of the Organs of the Tunicata and the Polyzoa—p. 275-290. (Harvey) Some account of the Marine Botany of the Colony of Western Australia—p. 525-566.

Vol. XXIII. Part I., Science. 1856.

Contains no article of Natural History.

BRITISH MUSEUM
NATURAL HISTORY



Niphargus stygius. Fig A. 1-9
N. aquilex. Fig. B.
Bathyporeia pilosa. Fig. C. 10-21

Jan.ry 1857.

Forster & C.o Dublin

EXPLANATION OF PLATE II.

Fig. A. Niphargus stygius (male), magnified.

1. Accessory flagellum of Antenna of upper pair. 2. Mandibula. 3. Maxilla of 1st pair. 4. Maxilla of 2nd pair. 5. Maxillary foot. 6. Natatory foot of 10th pair. 7. Saltatory foot of 12th pair. 8. Last segment (female), with Caudal appendage and Saltatory foot of last pair. 9. Inner style of foot of same pair, more magnified.

Fig. B. Niphargus aquilex, magnified.

Fig. C. 10. Bathyporeia pilosa, head and Antennæ. 11. Accessory flagellum of Antenna of upper pair. 12. Mandibula. 13. Maxillary foot. 14. Foot of 1st pair. 15. Terminal joint of same, more magnified. 16. Foot of 2nd pair. 17. Foot of 3rd pair. 18. Foot of 5th pair. 19. Abdominal foot of 4th pair. 20. Abdominal foot of 5th pair. 21. Abdominal foot of 6th pair.

Class CRUSTACEA. Ord. AMPHIPODA. Fam. GAMMARIDÆ.

Genus NIPHARGUS, Schiœdte, Act. Soc. Reg. Dan. A.D. 1851. *p.* 26.

Oculi nulli. Antennæ superiores inferioribus longiores, flagello appendiculari minuto, biarticulato. Pedes ultimi paris stylo interiori brevissimo, exteriori valde elongato, biarticulato.

1. *stygius*, Sch. *l.l.*, et Comm. Soc. Reg. Dan. A.D. 1855, *p.* 350.

Dorso simplici: epimeris anterioribus segmenta sua altitudine subæquantibus: segmento nono omnium altissimo.—Long. 5—7 lin. (Pl. II., Fig. A. 1—9.)

Inhabits the Grottos of Adelsberg and Lueg in Carniola; in little pools in the hollows formed by the dripping. It springs very nimbly, and is difficult to catch, making for the bottom immediately when disturbed.

2. *aquilex*, Sch. Comm. Soc. Reg. Dan. *l.l.*

Dorso carinato: epimeris omnibus segmento cujusque proprio altitudine inferioribus: segmentis octavo nono decimoque altitudine subæqualibus.—Long. 3—4 lin. (Pl. II., Fig. B.)

Obtained in considerable numbers, by pumping, out of a deep well near Maidenhead, in England, in the year 1853.

Except for the differences mentioned in the diagnosis, and the inferior size and more slender shape of the second species, the two are so like that we may transcribe the description of the *Grotto Niphargus* to illustrate the "*Well shrimp*" found in England.

Niphargus stygius. Elongated; the length five times the greatest depth from the back of the third segment to the lower edge of the epimeron; somewhat compressed, the greatest breadth not equalling the height of the third segment; smooth, entirely without ridges or teeth; colour, snow-white. *Head* scarcely one-twelfth of the entire length. The *first five segments* of nearly equal length, each a little longer than the head; the *following five* gradually larger, *ninth* the deepest of all; the *last three* gradually diminishing. *Epimera* finely scalloped on the anterior angle and lower margin, with a single bristle at each indentation; the *first four* pairs of them rather deeper than the corresponding segments, subquadrate, with the angles and margin rounded, the third the deepest of all; the *last three* pairs decreasing in size, the fifth scarcely as deep as its segment, with its lower margin deeply bisinuated, the sixth, which also is

bisinuated below, and the seventh, which is rounded there, scarcely more than a third of the depth of their respective segments. *Upper* pair of *Antennæ* long enough to reach to the hind margin of the fifth segment. *Scape* shorter by a fifth than the flagellum; composed of obconical joints, the first as long as the head; the second shorter and thinner than the first by about a fourth; third half the size of the second. *Flagellum* setaceous, composed of 16 to 25 joints, which become gradually longer towards the middle of the flagellum. *Accessory flagellum* a little longer than the first joint of the primary one; the first joint of it subcylindric; the second conical, about a third the length of the first. *Lower* pair of *Antennæ* about a third part shorter than the upper. *Scape* nearly twice the length of flagellum; the first two joints the shortest, and nearly equal to one another; the third and fourth nearly equal, each about three times the length of the second; the third subclavate; the fourth subcylindric, and rather more slender. *Flagellum* setaceous, of 7 to 9 joints, the length of which is variable, but usually not very unequal. *Mandibulæ* not longer than they are broad at the base, five-toothed; the apical tooth and the hind one elongated, the molar small and oval. *Palpi* two and-a-half times the length of the mandibulæ; the second joint clavate; the third elongate-oval; the two of equal length, and nearly thrice as long as the first. *First* pair of *Maxillæ* with the exterior mala armed with seven spines, each of which has a single tooth inside behind the middle. *Maxillary* feet with their exterior mala armed with a row of small blunt spines along the inner edge, and some longer sharp ones at the apical angle. *Palpi* one-half longer than the mala, the ratio of the joints :: 2 : 1 : $2\frac{1}{2}$: $3\frac{1}{2}$: 3. *First and second* pair of *feet* with the hand ovate, compressed, longer by a third than broad, and furnished with a compressed obtuse spine at the middle of the hind margin; second pair a fourth longer than the first; the ratio of the joints :: 6 : $1\frac{1}{2}$: $1\frac{1}{2}$: 3 : 6 : $5\frac{1}{2}$. *Third and fourth* pairs equal, slender, a fourth longer than the second pair; the ratio of the joints : : 6 : 1 : 4 : 3 : $3\frac{2}{3}$: $1\frac{1}{3}$. *Fifth*, *sixth*, and *seventh* pairs alike in form, but increasing in size successively; the fifth nearly a fourth part longer than the fourth, and the seventh nearly twice as long as this; ratio of the joints :: 4 : 1 : $3\frac{1}{2}$: $3\frac{2}{3}$: 4 : $\frac{3}{4}$. *Eighth*, *ninth*, and *tenth* pairs resembling each other; the *paddles* flagelliform, many-jointed, their natatory bristles longer, ciliated in a single row, obsoletely jointed behind the middle. *Last three* pairs of feet formed for springing; eleventh nearly twice as long as the segment that bears it; the styles equal, about a fourth part shorter than the basal plate; twelfth pair half the size of the eleventh, but like it in the form and proportion of the joints. Basal plate of the *last pair* of feet twice as long as the last segment; the interior style as long as a sixteenth part of the exterior style in the *male*,—as a seventh part of it in the *female*, furnished at the tip with two small spines, and a feathered bristle. Exterior style cylindrical; the first joint in the *male* thrice,—in the *female* twice as long as the basal plate, bedecked with tufts of short spines at each side, which are less conspicuous in the *male*, the outside tufts composed of two spines and a feathered bristle; second joint, in the *male*, about as long as the first, glabrous, perfectly smooth, with the tip alone tufted,—in the *female*, about half as long as the first joint, with tufts of minute bristles on the sides and at the tip. Claws of all the feet imperfectly jointed before the tip, and armed with a minute spine, inside, near the spurious joint. Caudal appendage as long as the last segment, deeply incised, bilobed; the lobes subovate; the tip truncated, three-spined; the outer edge with two incisions, the inner with one, each of which is armed with a single spine.

[Extracted from the Danish Royal Society's Transactions for 1851, and Proceedings for 1855.]

Class Crustacea. Ord. Amphipoda.

Genus Bathyporeia, Lindstrœm, Comm. Acad. Holm. A.D. 1855, p. 59.

Antennæ superiores articulo primo pedunculi magno et tumido, flagello appendiculari perpusillo. Antennæ *inferiores* pedunculo gracili, fere duplo longiore pedunculo superiorum. *Mandibulæ* apice valde acuminato; *palpo* triarticulato, articulo secundo crasso. *Palpus pedum maxillarium* articulatus; articulo secundo lato et foliaceo; tertio gracili, curvo et non ut plerunque ad apicem articuli præcedentis, sed palpi appendicularis modo, ad marginem exteriorem affixo. *Pedes thoracici primi* pares perbreves, debiles, articulo ultimo pyriformi, ungue valido. Pedes *secundi* paris præcedentibus duplo longiores, ungue carentes. Pedes *tertii quartique* paris inter se similes, ultimo articulo longo, gracili, curvo, ungue rudimentario. Pedes *quinti* paris femore magno clypeiformi, articulo tertio lamelloso, articulo quinto sine ungue. Epimera parva, margine setis instructo. *Pedes natatorii* forma vulgari. *Pedes spurii quarti quintique* paris breves. Pedes spurii *sexti* paris forma singulari: pars basalis duplo longior quam latior; ramus finalis interior rudimentarius et forma folii acuminati; ramus exterior magnus, biarticulatus; articulo primo lamelloso, parte basali ter ongiore; articulo secundo parvo acuminato, setis instructo.

The *upper Antennæ* shorter than the lower; *Scape* three-jointed; the first joint considerably larger than the other two together, enlarging from a slender base to the outer margin, and there obliquely truncated, so that the upper angle projects considerably beyond the lower; the two other joints slender, short, and cylindric; *Flagellum* composed of five cylindric joints, which diminish successively in length and thickness. *Accessory flagellum* two-jointed; the first joint in length and form resembling the first of the primary flagellum; the second small and almost rudimentary. The *lower Antennæ* extend beyond the upper, in consequence of the length of their *Scape;* the first two joints of this are short and broad; the third the longest, somewhat incrassated towards the end, and four times the length of the second joint; fourth joint one-half smaller than the third; *Flagellum* short, little longer than the second joint of the scape; composed of seven joints, which resemble the corresponding joints of the upper pair, but are rather shorter. Both pairs of antennæ are clothed with short bristles. Eyes black, small; somewhat produced and slightly reniform, placed immediately under the margin which bears the upper pair of antennæ. *Mandibulæ* with a produced slender point ending obtusely. *Palpi* inserted on a conical projection of the hind margin of the mandible; three-jointed; first joint very small; second much dilated on the inner edge, and there beset with some diverging bristles; last joint falcated, with several bristles at the obtuse tip. *Palpus of Maxillary feet* four-jointed; the first joint short and broad; only half as long as the second, which is of uniform breadth, flattened on the upper side, and thickly clothed with short hairs on the inside; third joint only a third as large as the preceding; attached to the hind margin of the second, as if it were an accessory palpus, but being strongly curved, it stretches over the outer margin of the second joint; fourth joint minute, rudimentary, with two minute spines at the top, but no trace of a claw. The outermost of the two laminæ belonging to the maxillary feet is the longest, and reaches to the middle of the second joint of the palpus; the inner one half as long, with a strong toothlike process of the margin. The *first pair of feet* is the smallest and slightest, about half as long only as the others; the first joint makes half of its length, and has a slight double curvature; the last joint is oval, or pear-shaped, with a pretty stout claw, and several rows of bristles. *Second pair* as large and

stout as the other thoracic feet, and somewhat flattened; the fifth joint tapers gradually to the end, so that it is nearly lanceolate; the hind margin of the leg thickly clothed with hairs—some simple, others plumose—which are longer than the joints they spring from. The *third and fourth* pairs resemble each other; having their third joint much enlarged from the slender base to the end; the fourth joint diminishing towards the end, and there rounded, only half as long as the preceding; the fifth joint slender and curved like a claw, bearing a short, obtuse, and nearly obsolete claw. The fifth pair has the first joint broad and dilated into the form of an obliquely obovate shield, minutely scalloped along the hind margin, with bristles springing from the indentations; the third joint also enlarged into a shield, with either margin curvilinear, except towards the external angle, where they converge to a rectilinear acute angle, the hinder edge beset with a number of stiff and straight plumose bristles, which stand erect, and reach outwardly to the end of the fifth joint; the fourth and fifth joints oblong, obliquely truncated at the end; the fifth beset with long stiff bristles around the margin and without any trace of a claw. The *sixth and seventh* pairs are nearly alike; the sixth longest of all, with a nearly orbicular femoral joint, thickly beset with bristles all round, as is also the hind margin of the following joints, so that a claw can scarcely be distinguished among the spiny bristles at the end of the fifth joint; the femur of the seventh pair is more elongated. The three pairs of *Natatory feet* are of ordinary shape, with a short basal joint, and a pointed *paddle* composed of about 10 to 12 joints; the *first two* pairs equal, and one-third less than the seventh thoracic pair; the *third* pair less than those two, as respects the length both of the basal joint and the paddle. The *fourth* pair of *abdominal* legs as long as the third, with the undermost of the two terminal joints shorter, partly from its insertion being higher upon the basal joints;—the *fifth* pair one-half less than the third, the terminal joints short, crowned at the tip with short spines: the *sixth* pair of peculiar form, occasioned by the very unequal development of the two parallel terminal branches; the basal joint short; the inner branch rudimentary, in the form of a minute pointed foliaceous scale, implanted at the base of the outer branch, which is composed of two joints; the first longest, elongate-lanceolate, slightly scalloped inside towards the tip and clothed with long plumose bristles; the second joint about one-fourth the size of the first, slender and subulate, with terminal bristles. *Caudal appendaye* composed of two equal lobes; rounded at the end and surrounded with bristles. *Epimera* small and rectangular. *Segments* of the body smooth and the form generally rounded. Length under 3 lines.

[Extracted from the Proceedings of the Royal Swedish Academy for the year 1855. See Notices of Serials, page 9, in this volume.]

A few specimens were found near Wisby, on a sandy bottom, at the depth of 18 to 24 fathoms: a specimen also at Landskrona.

The only other form with which this new genus has any points of near agreement is Anonyx Kr. The relative proportion between the peduncle and the flagellum of the upper antennæ indicates rather an analogy than an actual affinity. The form of the first pair of feet has a remarkable resemblance to that in Anonyx. In other respects, the genus is separated by the want of claws to the second and fifth pairs of thoracic feet, the peculiar structure of the maxillary feet, and the degree of development of the seventh pair of abdominal members.

Erratum. Page 11, lines 42 and 45, *for* Carynthian *read* Carniolan.

RUSSIA.

BULLETIN de la Classe physico-mathematique DE L'ACADEMIE Imperiale des sciences DE ST. PETERSBOURG. BULLETIN OF THE IMPERIAL ACADEMY OF ST. PETERSBURG. Section of the Physical and Mathematical Sciences. 4to. St. Petersburg.

Vol. XII. A.D. 1854.

(Brandt) Outlines of the classification of the Rodentia and the history of the genus Castor—p. 197-202. (Same) On the place of the genus Chiromys in the system—p. 273-281. (Bode) Observations on the migration of Birds—p. 289-304. (Marcusen) Preliminary notice relative to an essay on the family of Mormyri—p. 1-14. (Same) On the electric organ of Silurus—p. 203-210. (Weisse) The Natural History of Euglena—p. 169-174. (Same) Data concerning the Geographical distribution of the Infusoria—p. 378-380. (Trautvetter) The Cruciferæ of the government of Kiew—p. 350-352. (Ruprecht) Report of a Botanical journey through the government of St. Petersburg—p. 209-224. (Schrenck) Letter from Rio Janeiro concerning his voyage across the Atlantic—p. 361-368.

Vol. XIII. A.D. 1855.

(Brandt) Examination of the Crania of the Rodentia and of the genus Castor in particular—p. 104-108. (Same) On Capra ægagrus—p. 363-366. (Gruber) On the portion of the Styloglossus muscle which is attached to the ears; with two plates—p. 258-274. (Same) On the Lacrymal bone of the Ostrich and of the allied species; with three plates—p. 161-175. (Cienkowsky) Note on Stein's theory of the Acineta; with a plate—p. 297-304. (Meyer) On *Epilobium dodonæi* and the allied species—p. 156-158. (Same) Observations on the genera Diervilla, Weigela, Calysphyrum, and on a new genus related to them—p. 216-220. The new genus *Calyptrostigma* is founded on the Weigela *middendorfiana* Fischer. (Trautvetter) The Cuscuteæ of the government of Kiew—p. 369-379. (Same) The Urticaceæ of the same—p. 187-192. (Ruprecht) Review of the Description of the Phanerogamous plants of Esthonia, Livonia, and Courland by Wiedemann and Weber—p. 113-128. (Weisse) Microscopical examination of the Tripoli composed of organic remains which is found in the government of Simbirsk—p. 273-282. (Volborth) On the priority of the name *Zethus* Pand., for a genus of Trilobites, over *Cryptonymus* Eichwald—p. 289-297. (Goeppert) On the Fossil Flora of the Permian formations—p. 382-384. (Kokscharow) On the Clinochlore of Akhmatowsk; with two plates—p. 129-144. (Same) On the Mica with double axis from Vesuvius—p. 149-153. (Abich) On a landslip in the neighbourhood of Toula—p. 337-356. (Baer) Studies of the Caspian sea—p. 193-210, 305-332. (Middendorf) On the relation of Temperature to the Economy of Animals in Russia—p. 211-216.

Vol. XIV. A.D. 1856.

(Brandt) On the genera Gerbillus, Meriones, Rhombomys, and Psammomys; with a plate—p. 76-80. (Same) The different types of the Cranium in the g. Cricetus; with a plate—p. 182-184. *Cricetus vulgaris* and *nigricans* are considered as exemplifying one, *C. phæus* and *songarus* another fundamental form of the cranium in this genus. (Jakoubowitch and Owsjanikow) Microscopical investigation of the origin of the nerves in the brain—p. 173, 174. (Gruber) Anatomy of the intestines of the Leopard—p. 39, 40. (Same) On the internal Supracondyloid process of the bone of the femur, and the Supracondyloid bursa of the knee.—p. 267-270. (Middendorf) Studies of the Horse; with three plates—p. 81-93. (Cienkowsky) On the origin of a unicellular organism; with two plates—p. 261-267. (Ruprecht) Observations on the genus Calyptrostigma—p. 93, 94. (Same) Observations on some plants in the Imperial Botanical Garden of St. Petersburg—p. 229-238. (Trautvetter) On *Camforosma ovata* Waldst. and *C. annua* Pallas—p. 177-181. (Same) On certain Staticaceæ of Russia—p. 250-256. (Abich) On Earthquakes in the

North of Persia and the Caucasus, and on the sources of water and gas in connection with these phenomena—p. 49-72. (Same) On a calcareous Tufa, rich in sulphur, from the plain of Dyadin—p. 142-144. (Kokscharow) Contributions to the history of various Minerals—p. 299-318. (Struve) On the composition of the Vivianite of Kertch and of the Azure iron ore—p. 168-173. (Dittmar) Geognostical map of Kamskatka, with a brief explanation—p. 241-250. (Helmerson) On the gradual elevation of the Baltic Sea, and the influence which the waves and ice exercise on this; with a plate—p. 193-217. (Baer) Studies of the Caspian Sea, continued; with a map—p. 1-34. A discussion of the question whether the saline contents of the Caspian Sea are increasing. On the gulfs which are becoming more charged with salt, and on the salt lakes formed at the expense of the sea and of the adjoining land. (Moritz) On the proportion of salt in the waters of the South-west coast of the Caspian Sea—p. 161-168. (Schrenck) Letters from Fort Nicolaiewsk, concerning his voyage by the Pacific, and the Russian possessions in North America—p. 40-46, 184-192, 217-222.

SWEDEN AND NORWAY.

NYT MAGAZIN FOR NATURVIDENSKABERNE. NEW MAGAZINE OF THE NATURAL SCIENCES. Edited by the Physiographical Association of Christiania. 8vo. Christiania. Vol. VIII. A.D. 1853-1855.

(Barth) Report of a Zoological excursion in Lofoten and Weseraalen; concluded from Vol. VII.—p. 1-71. The present part contains a list of the birds, with observations on their habits. (Siebke) On the time of arrival of migratory birds in the neighbourhood of Christiania—p. 234-248. (Normann) Botanical excursion through a portion of the sea-coast between Stavanger and Bergen, from 59° 12′ to 60° 8′ North latitude—p. 249-335. With tables of the comparative Geographical distribution, in the North-West of Europe and the Arctic Regions of America, of the species which are common at Christiania, but diminish in number or disappear in the district examined. (Kjerulf) The Trachytic formation of Iceland—p. 72-116. (Same) On the Geological structure of the region about Monzoni and Predazzo in the Southern Tyrol; with a plan—p. 117-163. (Same) Analytical examination of various minerals—p. 173-196. (Mœller) Observations on Akmite—p. 164-172. (Mejdell) On the probable mode of formation of the sulphuriferous veins of Kongsberg—p. 197-210. (Forbes and Dahll) Mineralogical observations in the environs of Arendal and Krageroe; with a plate—p. 213-233. (Dahll) On the intrusive Granite in the iron ore beds of Arendal—p. 230-233. (Hœrbye) The Erratic phenomena on the boundary line of Norway—p. 337-384. (Same) Geognostical description of a portion of the boundary line of Norway; with a map—p. 385-432.

Vol. IX. Parts I. and II. A.D. 1856.

(Forbes, D.) On parallel structure in the older rocks—p. 1-13. (Same and Dahll) Mineralogical observations in the environs of Arendal and Krageroe; continued—p. 14-20. (Hœrbye) Notes on the Erratic phenomena in Lofoten, Senjen, and near Tromsoe—p. 21-30. (Kjerulf) Answer to the Academical Prize question proposed the 23rd of May, 1854, No. 6:—To investigate scientifically and compare the different Theories that have been proposed concerning the formation of the Unstratified rocks in the Transition series of Christiania—p. 31-88. (Koren) Report of a Zoological journey in the summer of 1850, undertaken at the expense of the Academy—p. 89-96. The observations here communicated principally regard the distribution of marine animals in the different belts of depth around the coast. (Sars) Contributions to the Zoology of the Mediterranean coast; with two plates—p. 110-164. Several new species are here described and figured:—*Polypi*, Xenia indivisa; Cladocora astræaria; Cœlocyathus typicus, *new genus;* Corynactis mediterranea; *Hydromedusæ*, Podocoryna fucicola; Eudendrium pusillum; Campanularia volubiliformis, gegenbaurii, breviscyphia.

DENMARK.

DET KONGELIGE DANSKE VIDENSKABERNES SELSKABS SKRIFTER. TRANSACTIONS OF THE DANISH ROYAL SOCIETY. Section of Physical and Mathematical Science. Fifth Series. 4to. Kjœbenhavn. Vol. IV. Part I. 1856.

(Schiœdte) *Corotoca* and *Spirachtha*, two viviparous genera of Staphylinidæ which live in the nests of Termites; with two plates—p. 41-59. This essay is translated and given at full length, with the accompanying plates, in the French Annals of the Natural Sciences, Zoology, Vol. V., A.D. 1856. (Steenstrup) The structure of the Hectocotylus in the genera Argonauta and Tremoctopus, illustrated by observations on similar structure in the Cephalopoda in general; with two plates—p. 185-216. These observations prove that the phenomenon is not confined to the two genera named, in which it is most fully developed. Steenstrup is of opinion that it has not only a physiological value, but also a systematical significance. The following table of the most striking differences in the mode of its determination will illustrate this. I. Octopods. These possess in the highest degree the faculty of reproducing lost arms and parts of them. A. Hectocotylus deciduous, colourless, developed in a sac. a. Hectoc. the third arm of the left side —*Argonauta*. b. Hectoc. the third arm of the right side—*Tremoctopus*. B. Hectoc. persistent, coloured, free, the third arm of the right side—*Octopus; Heledone*. II. Decapods. Destitute of the faculty of reproducing the arms. A. Myopsidæ. The Hectocotylus developed. a. In the first arm of the left side. *a*. Only the middle of this arm; the first of the right in some degree similarly affected—*Rossia*. *b*. In its whole extent, and this arm only—*Sepiola*. b. In the fourth arm of the left side. *a*. At the base only—*Sepia*. *b*. At the tip only—*Sepioteuthis; Loligo*. *c*. In its whole extent—Loliolus. B. Oigopsidæ *D'Orb*. No hectocotylus arm developed, as far as is known. The genera *Ommatostrepes; Onychoteuthis*; *Loligopsis*. The genus Loliolus is composed of some diminutive species (to which, perhaps, *Loligo brevipennis* Les. may belong), possessing most of the characters of Loligo, but approaching to the group Sepiola—Rossia in some respects. Aristotle appears to have been acquainted with the phenomenon here illustrated as regards the *Octopus vulgaris* of the Mediterranean; although his statements have been lately misinterpreted as referring to the conditions observed in Tremoctopus and Argonauta. The like development in other Cephalopoda has not entirely escaped the notice of modern writers on the order, but has generally been regarded as an abnormal diseased state of the animals. So D'Orbigny on Sepiola, in the Supplement to Ferussac's great work on the Mollusca. Steenstrup has included in this essay several suggestions for the rectification of the specific characters and synonymy of the Cephalopoda of the Northern Seas. The species of *Loligo* most common on these coasts is not the *L. vulgaris* of Lamarck, for which it had usually been taken, by Forbes and Hanley for example. Neither can *Loligo magna* of Rondelet be identified with it with any certainty, as has been supposed by Leach and others. Indeed, many of the characters given by that author seem rather to indicate a species of *Ommatostrephes*. Steenstrup accordingly has adopted the trivial name *Forbesii* for the *L. vulgaris* of Forbes and Hanley.

GERMANY.

ALLGEMEINE DEUTSCHE NATURHISTORISCHE ZEITUNG. GERMAN UNIVERSAL NATURAL HISTORY JOURNAL. Under the direction of the Isis Society of Dresden. New Series. 8vo. Hamburg. Vol. II. A.D. 1856.

ORIGINAL ARTICLES. ZOOLOGY.—(Kolenati) Synopsis and Description of the European Chiroptera—p. 121-138, 161-195. (Dehne) Arvicola neglectus *Thompson*, and Psammomys obesus *Rueppel*—p. 222-224. (Same) On a hen with male plumage—p. 67-69. (Same) Catalogue of Reptiles found in Italy in 1847, by Dr. Rabenhorst—p. 212-221. (Same) Cheilabothrus inornatus *Reinh.*—p. 221, 222. (Brehm, L.) New species of birds observed by A. and O. Brehm, and other remarkable species hitherto insufficiently described—p. 1-24, 41-67. The "species" here

treated in the author's peculiar point of view are all Raptorious birds. (Same) Appendix on the plumage of the young *Otogyps nubicus* and *pennatus*—p. 347-350. (Same) The Natural History of the birds observed about Renthendorf in the summer and autumn of 1855—p. 257-263. (Same) A few words about Cuckoos and Woodpeckers—p. 456-464. (Drechsler) On the order Gallinæ; the general arrangement according to Bonaparte, the species after Reichenbach, Chenu, Gray, &c.; with two plates—p. 361-381, 425-434. (Olavarria-Lozano) List of birds observed by Machado in some provinces of Andalusia—p. 241-256. (Otto) An instance of pairing between Columba œnas and the house pigeon—p. 30-32 (Hoffmannsegg) Limosa cinerea in its summer condition—p. 238-240. (Henke) Short account of an Oological excursion at Archangel—p. 236-238. (Jenzsch) Note on nests of *Anthophora retusa* Latr. or *pilipes* Fabr. in Trachytic Tufa of the Siebengebirge, and in the Paris basin—p. 73, 74. (Otto) Battles of animals—p. 148-151. (Brehm, A.) A word on so-called climatical varieties—p. 321-347. (Brehm, L.) A few words on the nature of "species"—p. 401-413. (Judeich) Proceedings of the Zoological section of the Isis for 1855-1866—p. 392-394 (Eschricht, &c.) Report on the competition for the Classen prize, the Embryology of *Cysticercus tenuicollis;* extract from the Proceedings of the Danish Royal Society—p. 303-309. Botany.—(Rabenhorst) The true nature of the "blood-stains" on bread, &c.—p. 418, 419. The author refers the cause of this phenomenon to the presence of an alga, *Palmella prodigiosa* Ehr. (Same) Another prodigy—p. 418, 419. *Palmella mirifica*, n. sp., which produces similar stains on dressed meat, &c. (Krause) Proceedings of the Botanical section of the Isis for 1855-1856. Geology, &c.—(Fischer) Remains of fishes from the Plæner formation; with a plate—p. 134-145. (Gutbier) The Basalt of Gorischstein—p. 413-418. (Otto) On the Rudistes—p. 195-198. Including an account of the ingenious and laborious method by which Zekeli has examined the organization of the Hippurites, Caprini, and Radiolites, extracted from the Proceedings of the Imperial Geological Institute. His conclusions support the views of Blainville and D'Orbigny, who have considered the Rudistes as constituting a separate class among the Mollusca, Palliobranchiata. (Same) On the forms of Granite blocks vulgarly called Giants'-forts and walls, Devils' dikes, &c.—p. 225-235. (Same) On compressed casts and abnormal forms of Cephalopoda, in the Quader formation of Saxony and Bohemia—p. 272-279. (Same) On an impression of a leaf in the slate clay of the lower Quader of Paulsdorf.p. 293-296 (Same) The mines of the Austrian empire—p. 69-72. (Zschau) The minerals in the Syenite of Plau near Dresden—p. 81-96. (Same) Anthracite in the Granite of the Gneiss of Arendal; calcareous spar and other minerals as Pseudomorphoses of Granite—p. 201-207. (Kluge) Proceedings of the Mineralogical section of the Isis for 1855-1856—p. 396, 397. Miscellaneous.—(Koch) Natural History notes of a journey in the Southern provinces of Russia—p. 297-302. (Schlenzig) Extracts from official documents of the last century on a case of a troop of rats adhering together by the tails—p. 453-456. (Reichenbach) The merits of Gœthe as a naturalist—p. 281-292. (Reinicke) On the microscope—p. 470-473. (Kluge) Communications respecting the Earthquake of the 12th of October, 1856—p. 464-470. (Judeich) The importance of forests in the economy of nature—p. 96-113. (Roch) Observations on the migration of birds, on the vegetation and temperature in the year 1855—p. 193-195. (Drechsler) Report of the Meeting of German Naturalists and Physicians at Vienna--p. 434-451. (Same) Scientific Proceedings of the General meetings of the Isis for 1855-1856—p. 382-391.

Short Communications and Extracts. Geological Institute of Vienna: Remains of Plesiosaurus in the Lias of Bavaria—p. 32. Hollow pebbles in the Leitha limestone—p. 34, 480. Lithographic stone of Bassaro—p. 77. New localities of fossil plants in Italy—p. 79. New discoveries of fossil fishes—p. 156. Anthracites more ancient and more recent than the Basalt—p. 310. The fossil Flora of Budweis—p. 311. Method for giving durability to perishable fossils—p. 312. Geological Survey of Missouri—p. 313. Geology of Ofen and Pesth—p. 313. Ancient Elevation of the Continents of Europe, Asia, and Africa—p. 314. Subaqueous protrusion of Basalt—p. 318. The cavern of Agtelek and the multitude

of bats in it—p. 320. Piauzite found in Styria—p. 350. Pisolitic Quarz—p. 351. Geology of America—p. 352-354. The nature of *Aptychi*—p. 354. Carbonised wood in rock salt—p. 476. Subterranean caverns near Brunn—p. 478. The granite of Carlsbad—p. 478. Remains of Dinotherium and Acerotherium incisivum—p. 486-487. Mineral pitch—p. 488. Fossil insect remains of Radoboj—p. 488. Geographical Society of Vienna. On Lichens that yield dye-stuff—p. 74. The Basin of Northern Carynthia—p. 75. Austrian species of Asphodelus—p. 75. Descent of Glaciers—p. 355. Imperial Academy of Vienna: The Primitive forest of Bohemia—p. 315-317. Geological Society of Germany: Remains of animals of Arctic and Tropical forms in the Diluvium of Germany—p. 79. The Eruption of Vesuvius in 1855—p. 155. Royal Academy of Berlin: Insects of Mozambique—p. 37-39. Cellulose in coal—p. 39. Natural place of the genus Ouviranda—p. 279. Microscopic Geology of the Southern States of North America—p. 357. Nanadine lead ore—p. 358. Parasitic sacs on larvæ of Phryganeæ—p. 359. The systematic place of the genus Mermops, *Vampyrus auritus*, n. sp., &c.—p. 479. New Crinoidea from the limestone of Eifel—p. 483. *Lepidocentrus eifelianus*, a new fossil Echinoderm—p. 484. South American rocks composed of microscopical organic remains—p. 485. Fossil plants of the Peruvian formation of Moravia—p. 486. Natural History Society of Prussian Rhineland and Westphalia: Amorphous black diamond—p. 473. Accelerated development of the larvæ of frogs by artificial warmth—p. 674. The most ancient fossil land plants of Europe—p. 675. French Academy: The blood river of Choluteca, in Central America—p. 689. Species of Valerian with eatable tubers—p. 490. Sensibility of the Sinews—p. 491. The plants of Chios—p. 492. MISCELLANEOUS.—Derivation of the names Basalt and Cobalt—p. 119. Cetacean remains in the Tertiary sand of Linz—p. 318. Occurrence of Turdus roseus near Dresden—p. 320. Geological theories of the last century—p. 481. Preservative liquid for fishes, reptiles, &c.—p. 489.

REVIEWS.—Salvin and Brodrick: Falconry in the British isles—p. 85. Hasse: Native birds; in fifty woodcuts—p. 82. Kirby and Spence: Introduction to Entomology; Seventh Edition—p. 85. Redtenbacher: The Fauna of Austria; Coleopterous insects—p. 104. Gistel: Mysteries of the European Insect world—p. 86. Schwacke: Pocket-book for collectors of Lepidopterous larvæ—p. 111. Webber: The Romance of Natural History; translated from the English—p. 78, 115. Mueller: Botanical journey round the world—p. 113. Borchmann: The Flora of Holstein—p. 98. Fuckel: The Flora of Nassau—p. 86. Rabenhorst: Specimens of the Fungi of Germany; Third century—p. 57-64. Cohn: The history of gardens—p. 99. Giebel: The petrifactions in the Muschel-Kalk of Zieskau—p. 93. Zeis: Descriptions of various diseased bones of primeval animals—p. 95. Quenstedt: Popular essays in Geology—p. 3-5. Beust: On the position of the Metalliferous veins in relation to the Porphyry of Saxony—p. 49, 50. Cotta: Mineralogy—p. 24. Cotta: Geological sketches; Third edition—p. 94. Cotta: History of the Floetz formation—p. 109. Geinitz: Geognostical account of the coal-fields of Saxony—p. 69, 70. Hartmann: Coal and iron—p. 77. Winkler: The Pseudomorphoses of the Mineral Kingdom—p. 33. Diefenbach: Geological map of the Grand Duchy of Hesse—p. 101. Pfaff: Cosmogony—p. 1-3. Reinsch: The Creation; Second Edition—p. 110. Schneider: History of the earth—p. 93. Masius: Studies of Nature; Sketches of Vegetable and Animal life—p. 115. Molt: Picture of Animal and Vegetable life in the various regions of the globe—p. 86. Moleschott: Light in its relation to Life—p. 103. Maury: Physical Geography of the sea—p. 34. Stahl: The Wonders of the world of Waters—p. 114. Stein: The Physical sciences in their relation to the material and spiritual interests of humanity—p. 65-67. Fabri: Letters in refutation of Materialism—p. 6. Frauenstadt: Materialism; In answer to Buckner—p. 87-90. Weber: The latest Deification of Matter—p. 41. Anonymous: Scientific illustration of Materialism—p. 86. Willkomm: The wonders of the Microscope—p. 112. Heller: The Dioptrical Microscope—p. 36. List of new works on Natural History published in Germany and France during the year 1856.

OBITUARY.—Karl Heinrich Aster—p. 38. Johann Charpentier—p. 39. Johann Friedrich Anton Dehne—p. 53-56. Friederike Liènig—p. 71-76.

ACTA NOVA ACADEMIÆ C. L. C. NATURÆ CURIOSORUM. NEW TRANSACTIONS OF THE IMPERIAL ACADEMY OF NATURALISTS. 4to. Bonn.
Vol. XXV. Part II. 1856.

(Hannover) On the development and structure of the teeth in Mammalia; with eight plates—p. 805-936. (Jaeger) *Icthyosaurus longirostris* Owen and Jaeger, *n. sp.*, and observations on the other Reptiles found in the Lias formation of Wurtemburg; with a plate—p. 937-967. (Glocker) On the Northern Diluvium of the Oder about Breslau; continued from Vol. XXIV.—p.767-804.
Vol. XXIII. Supplement. A.D. 1856.
(Lehmann) Revision of the Potentillæ; with sixty-four plates—pp. 231.

LINNÆA EIN JOURNAL FUER DIE BOTANIK, ETC. LINNÆA, A GENERAL BOTANICAL JOURNAL. Edited by Schlechtendahl. 8vo. Halle.
Vol. XI. A.D. 1855, 1856.

(Berg) Revision of the Myrtaceæ of America known up to this time; forming part of Klotzch's Flora of Equinoctial America—p. 1-472. Distributed into the following tribes:—I. Myrteæ (with five sub-tribes—Myrciodeæ, Eugenioideæ, Pimentoideæ, Myrrhinioideæ, Orthostemonoideæ); II. Barringtonieæ; III. Lecythideæ; IV. Granateæ; V. Leptospermeæ. (Schlechtendahl) Supplementary observations on the plants cultivated in the Botanic Garden at Halle, made in the year 1854, or previously—p. 473-552. (Hampe) Enumeration of the Hepaticæ included in the second section of the plants of Chili, and in the plants of Peru, collected by Lechler, and published by Hohenacker—p. 553-556. (Schlechtendahl) The Ranunculaceæ and Borragineæ of the same collection—p. 556-560. (Koernicke) Supplement to the Monograph of the Eriocaulaceæ—p. 561-692. (Hanstein) The Gesneriaceæ of the Royal Herbarium and of the Botanic Garden at Berlin; with a Monographical synopsis of the family in general: Section II. The Genera and Species; Part I. The Niphaeæ and Achæmeneæ—p. 693-785. Index, Title, and Contents of Vol. XI.

ENTOMOLOGISCHE ZEITUNG HERAUSGEGEBEN VON DEM ENTOMOLOGISCHEN VEREINE ZU STETTIN. ENTOMOLOGICAL JOURNAL, MONTHLY, OF THE ENTOMOLOGICAL ASSOCIATION OF STETTIN. 8vo. Stettin.
Vol. XVII.; with Portrait of Erichson and a Plate. Stettin. 1856.

COLEOPTERA.—(Bach) Additions and corrections to the Fauna of Northern and Central Germany—p. 241-247. The following new species of Curculionidæ, *Baridius resedæ*, the larva in the roots of Reseda luteola; *Phytonomus monticola*, *Sciaphilus ptochoides*; further, *Saprinus specularis*; *Haltica nigriventris*; *Eucnemis heydenii*, reared from larvæ in rotten beechwood. (Dohrn) The Fauna of Stettin—p. 188-191. Remarks on the localities of Miscodera arctica, the several species of Chlænius and Marmaropus besseri. (Georg) *Bostrichus alni*, *n. sp.*—p. 59-61. With remarks by Ratzeburg. (Kraatz) Synonymic notes—p. 177-181. On Staphylinidæ and some others. (Same) Addenda to the revision of the genus Catops, and observations on Cryptophagus—p. 237-241. New species described, *Catops nitidicollis*, *nivalis*; *Cryptophagus grandis*, *validus subfumatus*. (Mueller) *Glyptomerus*, a new genus of Staphylinidæ—p. 308-312. A blind insect found in a cave. Mueller refers it to the group Oxyporin; but Kraatz—Entomological Journal Vol. XVIII., p. 95—has remarked that it scarcely differs from Lathrobium, except in wanting eyes. (Steffany) Notes on the Catalogue of European Coleoptera—p. 52-59. (Steirlin) Synonymic remarks—p. 361, 362. Polydrosus penninus is merely a variety of P. fulvicornis *Sch.*, and Rhytirhinus alpinus *Bremi* seems to be identical with

Dichotrachelus rudenii *Steirlin.* (Suffrian) Synonymic Miscellanies, XIII., on the species of Carabus—p. 91-103. (Same) Collation of some species of Coleoptera, with the Fabrician types; the genus Cantharis—p. 248-250. (Same) Synonymic remarks on the genera Acalles and Scleropterus—p. 250-252. The latter genus falls, being founded merely on a sexual difference more strongly pronounced in certain species of Acalles. NEUROPTERA.—(Hagen) The Odonata of the Russian empire—p. 363-381. Hagen calculates the Libellulidæ of Asiatic Russia at one hundred species. Russia in Europe has ninety-eight species, all of which are common to it with other countries of this continent. None of the Mediterranean species extend into Russia, although some of them are found in the Southern part of the British islands. Eight new species from the Asiatic provinces and one from North America are named, which will be described in De Selys and Hagen's Monographs of the Libellulidæ, now in course of publication. (Same) On an Oligoneuria figured by Costa, Fauna de Aspromonte—p. 383. (Zeller) Review of Fischer's Orthoptera of Europe—p. 18-27. HYMENOPTERA.—(Reinhart) Observations on the Natural History of various parasitic Hymenoptera—p. 103-110. (Ruthe) On Dicelloceras vibrans—p. 46-48. According to Ruthe, probably only a variety, with imperfect wings, of Encyrtus platycerus Dalman. (Same) Prodromus of a Monograph of the genus Microctonus—p. 219-308. Thirty-three species are characterised here, all natives of Germany, of which twenty-three hitherto undescribed. LEPIDOPTERA.—(Heyden) Chelonia quenselii *Paykull* and its larva—p. 184-188. (Schreiner) Remarks on Tessien's Catalogue of Lepidoptera found about Altona and Hamburg—p. 110-117. (Standfuss) On some Lepidoptera of the coasts of Spain and Sicily; continued—p. 48-52. (Staudinger) The Lepidoptera of Upper Carynthia; concluded—p. 37-46. (Same) An essay towards the critical determination of the known species of Sesiæ of Europe and the adjoining part of Asia—p. 145-176, 193-254, 257-288, 321-338. The number of species is reduced to fifty-six, viz., Trochilium 3, Sciapteron 5, Sesia 45, Bembecia 1, Paranthrene 2. (Speyer) Review of Herrich-Schæffer's Lepidoptera of Europe—p. 383-385. DIPTERA.—(Gerstæcker) Essay on the Henopii—p. 339-361. The differences of sex have given occasion to an erroneous multiplication of species in this family. The females in general have a smaller head, broader abdomen, and longer wings. Fallen appears to have known the distinction of the sexes, but he has neglected to signalize these differences. Erichson has treated these as specific characters. Thus *Acrocera orbiculus* Er. is the female of *A. globulus; Oncodes cingulatus* Er. the female of *O. gibbosus;* while Syrphus gibbosus Pauzer should be united as the other sex to *O. zonatus* Er., and *O. fuliginosus* to *O. varius* Er. A new genus of the family, *Eulonchus*, is characterized, founded on an insect from California, *E. smaragdinus.* The following are new species—*Acrocera laeta* from Sardinia, *Ocnæa lugubris* from Brazil. HEMIPTERA.—(Hagen) The Cicadæ of Europe; with a plate—p. 27-37, 66-91, 131-142, 381-383. This elaborate Monograph, concluded in the present volume, includes eighteen species, nearly half of which, however, are properly Asiatic or African. The genus is distributed into five groups, of which the first constitutes the genus *Tibicen*, and the last the genus *Platypleura* of Latreille. The most comprehensive of these groups is the fourth, containing five species properly belonging to Southern Europe. The most widely distributed among these, and the only one which occurs in the British Islands, as well as in Sweden, but only in the southern part of either, is *C. montana* Scopoli, which has been described under nine different trivial names. The most important synonyms among these are *C. hæmatodes* L., Fabr., Fallen, *C. tibialis* Latr., *C. anglica* Leach, Curtis, *C. concinna* Germar. The last is a variety with clouded wings, to which also the specimens of the Linnean collection are probably to be referred. MISCELLANEOUS.—(Menzel) On the structure and insertion of the hairs, spines, &c., in the Arthropoda—p. 117-127. (Hagen) On the need of an Entomological Bibliography—p. 254. (Dohrn) Review of Gistel's Mysteries of the Insect World—p. 312-319. (Same) Review of Douglas's World of Insects—319. OBITUARY.—(Gerstæcker) Biographical Memoir of Dr. Klug—p. 225-237. Proceedings, List of Members, &c.

LINNÆA ENTOMOLOGICA. JOURNAL, ANNUAL, OF THE ENTOMOLOGICAL ASSOCIATION OF STETTIN. 8vo. Stettin. Vol. XI. 1857.

(Kraatz) Illustrations of the genera of Aleocharini; with two plates—p. 1-43. As a supplement to Erichson's Monograph, and accordingly written in Latin. Figures of the parts of the mouth are given to illustrate the new genera established by the author in the Insects of Germany, and others which required corrections. The following new genera are established for exotic insects—*Hoplandria*, Homalota terminata *Er.*, and three new species, all American; *Philotermes*, three new species, inhabiting the nests of termites in the United States of N. America; *Oxysoma*, a single species found in ants' nests in Egypt. All these belong to the first sub-tribe; no new genera have occurred in the Gyrophænini or Gymnusini. (Same) The insects that inhabit the nests of the Termites—p. 44 56. In addition to Philotermes, before named, and the genera Corotoca and Spirachtha of Schiœdte, three more new genera of Aleocharini are characterised here, *Cœnonica*, *Tetrasticta*, *Peliop-tera*, and ten new species of Myrmedonia. The species of *Porus* Hope probably belong to the same category. (Suffrian) The Cryptocephali of Africa—p. 57-256. The additional forms from this quarter have increased the table of the genera given in Vol. IX. with two new ones, *Cœnobius*, the South African representative of Monachus, and remarkable on account of the large eyes meeting on the front in both sexes, and *Achœnops*, a singular form, here placed between Pachybrachys and the genuine Cryptocephali. (Gerstæcker) Contribution to the history of exotic Stratiomydæ; with a plate—p. 261-350. A Monograph of the genus Cyphomia, of which thirty-four species are described, including ten new species, and four that the author has not seen, the descriptions of which are copied. Two new genera are proposed, *Chordonota* for Cyph. inermis Wied., and *Euparyphus* for C. elegans Wied. The rest of this essay is, as the author himself describes it, more fragmentary, being devoted to the description of remarkable new species of various genera in the Berlin Museum, and the characters of several new genera, *Pycno-malla* for Stratiomys splendens Fabr., and S. auriflua Er.; *Blastocera*, *Spyridopa*, and *Panacris*, new forms which, along with Acanthina and Chauna, may compose a peculiar section in the family. (Frey) Revision of the Nepticulæ—p. 351 447. This genus, containing the minutest forms in the order Lepidoptera, presents one of the most striking instances of what has been done, and what remains to be done for native Entomology, by diligent and concentrated labour. Haworth, the first author who makes an epoch in the history of the group, knew ten British species in 1828. Zeller gave thirteen European species in his Monograph of the genus published in 1848. Stainton has recorded thirty-four British species, and has been enabled to give the history in full of not less than twenty-one in his beautiful work, the Natural History of the Tineina, Vol. I., London: 1855. In the present essay the number of European species is brought up to fifty-eight, of which three, *N. aucupariæ*, *lonicerarum*, *aceris*, are new additions.

ZEITSCHRIFT FUER ENTOMOLOGIE IM AUFTRAGE DES VEREINS FUER SCHLESISCHE INSECTENKUNDE. JOURNAL OF THE ENTOMOLOGICAL ASSOCIATION OF SILESIA. Edited by A. Assmann. 8vo. Breslau.
Vol. IX. A.D. 1855.

LEPIDOPTERA.—(Prittwitz) Addenda to the Lepidopterous Fauna of Silesia—p. 1, 2. (Same) *Cucullia fraudatrix* Eversmann, a species new to Silesia—p. 3, 4. (Assmann) Remarks on the preceding articles, and on the distinction between the species of Argynnis, *pales* and *arsilache*—p. 5-14. (Same) On the early states of *Noctua conflua* Fr., and on a Hermaphrodite of this species; with a plate—p. 15-28. (Neustadt) Notes on the species of Lepidoptera that occur about Græfenberg and on the Altvater in Austrian Silesia—p. 29-36. COLEOPTERA.—(Letzner) A classified Catalogue of the Larvæ of European Coleoptera observed and described up to this time, with references to the authorities; with two plates—p. 1-77. Taken in great part from the Catalogue of Chapuis and Candéze, but contains some species in addition, and some references not included in this. (Same) The larva-cases of *Clythra scopolina* L., *Cryptocephalus pini* L., and *Cr.*

janthinus Germ.—p. 78-80. (Same) On *Cassida lineola* Creutz, and the earlier states of this species—p. 80-88. Proceedings—pp. 14.

Physikalische Abhandlungen der K. Akademie der Wissenchaften zu Berlin. Transactions of the Royal Berlin Academy of Science. Section of Physical Sciences. For the year 1855. 4to. Berlin. 1856.

(Braun) On *Chytridium*, a genus of unicellular plants, parasitic upon Algæ and Infusoria; with five plates—p. 21-83. Nineteen species are characterised:—C. olla, acuminatum, oblongum, lagenula, mamillatum, sporoctonum, globosum, pollinis, laterale, subangulosum, transversum, depressum, cornutum, hydrodictyi, decipiens, apiculatum, endogenum, saprolegniæ, ampullaceum. (Beyrich) On the connection between the Tertiary formations of Northern Germany, for the illustration of a general Geological chart—p. 1-20. (Ehrenberg) On the Greensand, and the illustration it affords of Organic life—p. 85-176. The sequel of this essay, with the seven plates which illustrate it, are reserved for a following volume.

Zeitschrift fuer Wissenchaftliche Zoologie. Journal of Scientific Zoology, by Siebold and Koelliker. 8vo. Leipzig. Vol. VIII. A.D. 1856, 1857.

(Mueller) Anatomical and Physiological examination of the Retina in Man and Vertebrate animals; with two plates—p. 1-122. (Ecker) On the mucous membrane of the nose in Man; with a plate—p. 303-306. (Koelliker) Observations on the terminations of the Nerves of the skin, and on the structure of the Muscles; with a plate—p. 311 325. (Luschka) On the Alæ minimæ of the Sphenoid, processes hitherto overlooked; with a plate—p. 123-128. (Bezold) Inquiries into the distribution of water, organic materials, and inorganic combinations in the Animal Kingdom—p. 487-524. (Kunde) On substraction of water from the Animal tissues, and on the formation of temporary Cataracts in consequence—p. 466-486. (Czermak) On the structure of the Rattle of Crotalus; with a plate—p. 294-301. (Ankermann) On the motion and development of the spermatic filaments of the Frog; with a plate—p. 129-151. (Semper) On the formation of the Wings, Scales, and Hairs, in the Lepidoptera; with a plate—p. 326-339. (Hering) On the Anatomy and Physiology of the Generative organs of Lumbricus; with a plate—p. 408-424. (Thompson) On the spermatic corpuscles, the Eggs and Impregnation of *Ascaris mystax*—p. 425-438. Walter (Contributions to the Anatomy and Physiology of *Oxyuris ornata*; with two plates—p. 168-201. (Aubert) On *Gryporrhynchus pusillus* a free Cestoid Nurse—p. 274-293, 525, 526. (Burmeister) A few words more on the Systematic place of the Rotifera—p. 152-158. (Weisse) Note on *Limnias melicerta*, and its identity with *L. annulatus* Bailey—p. 302. (Wagener) On the connection of the Nucleus and nucleus corpuscle of the Ganglion cell with the Nervous filament; with a plate—p. 455-457. Vindicating the accuracy of Lieberkuehn's observations on the frog against the doubts of Stilling, and confirming them from examinations of the Ganglia in Hirudo medicinalis, Aulacostoma nigrescens, Limax ater and Lymnæus stagnalis. (Semper) Contributions to the Anatomy and Physiology of the Pulmonata; with a plate—p. 340-399. The species particularly investigated are Arion empiricorum, Limax agrestis, variegatus, Helix pomatia, Lymnæus stagnalis, Planorbis marginatus. (Hague) On the natural and artificial formation of Pearls of China; Translated from the Journal of the Royal Asiatic Society—p. 439-444. (Siebold) On the formation of pearls in Chinese fresh-water Pearl-massels; an Appendix to the preceding paper; with two plates—p. 445-454. (Gegenbaur) An attempt at a classification of the Medusæ, with descriptions of new or imperfectly known forms; as a contribution to the Fauna of the Mediterranean; with four plates—p. 202-273. (Lieberkuehn) On Protozoa; the conjugation of Actinophrys, the embryology of Spongilla, &c.—p. 307-310. (Radlkofer) On true Parthenogenesis in plants—p. 458-465. Prospectus of Contributions to the Natural History of the United States by Agassiz—p. 159-162.

NEUES JAHRBUCH FUER MINERALOGIE GEOGNOSIE N. S. W. NEW ANNALS OF MINERALOGY, GEOGNOSY, GEOLOGY, AND PALEONTOLOGY. 8vo. Stuttgart.

Vol. for 1856. Parts VI. and VII. A.D. 1857.

ORIGINAL COMMUNICATIONS.—(Bronn) Geological law of development of the Conchiferous Mollusca—p. 641-663. (Pichler) Geology of the Tyrolese Alps—p. 661-663. (Schindling) Analysis of a mineral known as "flesh-coloured Barytes"—p. 664. (Weiss) Rectification of Pfaff's critique of the "Fundamental Principles of Mechanical Geology"—p. 769 793. (Rœmer) Notes of a Geological and Paleontological excursion to Sweden—p. 794-815. Correspondence—p. 665-674, 816-829. New Books—p. 675-677, 830, 831. Scientific Journals—p. 675-685, 832-840. Reviews and Extracts—p. 686-768, 841-876. Index—pp. 20.

We would willingly give, if space permitted, the enumeration of the articles extracted and condensed from other sources in these Annals, the value of which to every student of Geology is but inadequately represented by the list of original communications. We hope in future to be able at least to indicate the chief new matter communicated in the correspondence.

ABHANDLUNGEN HERAUSGEGEBEN VON DER SENCKENBERGISCHEN NATURFORSCHENDEN GESELLSCHAFT. TRANSACTIONS OF THE SENCHENBERG SOCIETY OF NATURALISTS; being a new Series of the Museum Senckenbergianum. 4to. Frankfurt am Main.

Vol. I.; with twenty Plates. A.D. 1854, 1855.

(Lucæ) Examination of the skulls of the Pongo and Ourang-outan with regard to the differences of species and age; with six plates—p. 154-167. (Mettenheimer) Anatomical and Histological examination of *Tetragonurus cuvieri* Risso; with three plates—p. 214-257. The condition of the two specimens of this fish at the author's disposal did not afford materials for the complete illustration of the splanchnology. He found the quadrangular form of the tail to be produced by the symmetrical development of both halves of the body of the vertebræ, and of the large lateral muscle of the tail. The anatomical details do not favour the removal of the genus from the Mugilidæ, with which it has been classed, to a place among the Ganoid fishes. (Same) On the structure and economy of some Invertebrate animals of the German seas; with a plate—p. 1-18. (Same) On the locomotion of Littorina litorea, and of the Gastropoda in general—p. 19-23. (Kloss) On parasites found in the kidneys of Helix; with two plates—p. 189-213. (Schmidt) On the history and development of Gregarinæ; with a plate—p. 168-187. (Buchenau) On the development of the flowers of some Dipsaceæ, Valerianeæ, and Compositæ; with two plates—p. 106-132. (Schacht) On the petiolated racemose formations in the leaves of many Urticeæ, and on analogous productions in some Acanthaceæ; with a plate—p. 133-153. (Bary) On the genera of Algæ *Œdogonium* and *Bulbochæte*; with three plates—p. 29-105. (Hessenberg) On the Crystallography of the Muriate of Mercury; with figures—p. 24-28. (Scharff) Studies of the Natural History of Crystals; with a photographic plate—p. 258-306.

Vol. II. Part I.; with eight Plates. A.D. 1856.

(Mettenius) On some genera of Ferns:—1. *Polypodium*; with three plates—p. 1-138. Rejecting as untenable the genera recently separated from Polypodium on the ground of differences of veining of the leaves, the author enumerates here 392 species, disposed under seventeen sections. More than two-thirds of that number known to him in nature are described, the descriptions of a few being omitted which are included in his work "The Ferns of the Leipzig Botanical Garden." (Same) On *Leptothrix ochracea* Kuetzing, and *Gaillonella ferruginea* Ehrenberg; with a plate—p. 139-157. The two, as he concludes, are only different stages of development of the same organism. Associated with these, in the water of the Wilhelmsbad, is another alga, to which the author applies the name *Glœotila ferruginea* given by Kuetzing to the Gaillonella of Ehrenberg. (Fresenius) On the genera of Algæ *Pandorina*, *Gonium*, *Rhaphidium*; with a plate—p. 187-200. (Hessenberg) Mineralogical notes; with three plates—p. 158-186.

ABHANDLUNGEN DER K. K. GEOLOGISCHEN REICHS-ANSTALT. TRANSACTIONS OF THE IMPERIAL GEOLOGICAL INSTITUTE. Folio. Vienna.

Vol. III. 1856.

(Hoernes) The Gastropoda and Pteropoda of the Tertiary basin of Vienna; with a map and fifty-two plates on India paper—pp. 736. Five hundred species, one Pteropod *Vaginella depressa*, the rest Gastropoda, from nearly two hundred different localities in this district are here figured, many of them in various aspects and ages. The plates are beautiful specimens of Lithographic art. The illustrations further comprehend a Latin diagnosis, the measurement after D'Orbigny's method, the Synonyms in Chronological order, a particular enumeration of localities, and the description of the species in detail with especial reference to living forms. The area of diffusion of every species is further shown in one view, by means of a table of sixty-six columns, filled up for the Tertiary Deposits elsewhere, which have been investigated hitherto.

FRANCE.

SUPPLEMENT DES COMPTES RENDUS HEBDOMADAIRES DES SEANCES DES L'ACADEMIE IMPERIALE DES SCIENCES DE L'INSTITUT DE FRANCE. SUPPLEMENT TO THE WEEKLY PROCEEDINGS OF THE FRENCH ACADEMY OF SCIENCE. 4to. Paris.

Vol. I.; with twenty-three plates. A.D. 1856.

(Bernard) Essay on the Pancreas, and function of the Pancreatic juice in the digestive process, especially in the digestion of Adipose substances—p. 379-563. (Derbès and Solier) Essay on some points of the physiology of Algæ—p. 1-120. The classification of Algæ, based on the observed phenomena, is as follows:—1. Spores having motion (zoospores): Antheridia none or undiscovered. A. Zoospores produced in all the cells of the frond; or in special cells, but developed simultaneously with the others, and resembling them, or more rarely differing in form. Fam. 1. Nostochineæ: Nostoc, Sphærozyga. Fam. 2. Ulvaceæ: Tetraspora, Ulva, Colpomena. Fam. 3. Conferveæ: Hydrodictyon, Hormiscia, Tribonema, Tiresias, Conferva, Chætophora, Draparnaldia, Bretonia. B. Zoospores produced in particular and localised organs (cystocarps); developed at a determinate period of the vegetation. a. Cystocarps in communication originally, and sometimes permanently, with the rest of the frond. Fam. 5. Siphoneæ: Bryopsis, Derbesia, Codium, Dasycladus, Halymeda. d. Cystocarps separated, from the first, from the rest of the frond. Fam. 4. Ectocarpeæ: Ectocarpus, Sphacelaria, Giraudia. Fam. 6. Mesogloieæ: Liebmannia, Stylophora, Castagnea, Nereia. II. Spores destitute of motion; Antheridia producing Antherozoids. A. Antherozoids furnished with Endochrome. Fam. 7. Cutlerieæ: Cutleria. Fam. 8. Fucaceæ: Cystoseira. B. Antherozoids hyaline. a. Reproductive corpuscles produced in all the cells, or in cells resembling those of the rest of the frond, and developed simultaneously with them. Fam. 9. Bangieæ: Porphyra, Bangia. d. Reproductive corpuscles produced in localised organs, which are developed at a determinate period of the vegetation. *a.* Fruit capsular (polyspore); with a continuous membranous coat. Fam. 10. Delesserieæ: Aglaophyllum. Fam. 11. Ceramieæ: Callithamnion, Griffithsia, Ceramium, Wrangelia. *b.* Polyspore with a cellular coat. Fam. 12. Rhodomeleæ: Polysphæria, Rytiphlœa. Fam. 13. Chondrieæ: Laurencia, Bonnemaisonia.

MEMOIRES PRESENTES PAR DIVERS SAVANTS A L'ACADEMIE DES SCIENCES, ETC. COMMUNICATIONS NOT BY MEMBERS, PRESENTED TO THE FRENCH ACADEMY. 4to. Paris.

Vol. XIV. A.D. 1856.

(Martin St. Ange) Studies of the Reproductive system in the five classes of Vertebrate animals, in the anatomical, physiological, and zoological aspects; with seventeen plates—p. 1-232. (Dufour) Anatomical and physiological history of Scorpions; with four plates—p. 561-657. This subject has already exercised the

scalpel, and the pen and pencil of several able Anatomists, in particular Treviranus, Mueller, Newport, and Duverno. Dufour himself has previously, in 1817, published anatomical observations on Scorpio occitanus. The present essay, based on the examination of nine different species, under circumstances more favourable than preceding observers could command, offers, doubtless, the most complete and trustworthy account that has yet appeared of the structure of this family, which is peculiarly interesting from its highly complicated organization, and because of the light it throws on the rest of the class, in which the parts become more crowded and confounded, so as to disguise their homologies. Dufour having traced the origin of the nerves which supply the mandibles and chelipalps to the first thoracic ganglion, accordingly denies the existence of antennæ in this tribe, and by inference in the rest of the Arachnida. This conclusion agrees with the view entertained by Latreille, who gave the name of *Acera* to the class in consequence. Dufour has observed that the larger or intermediate eyes possess a certain degree of mobility of the visual axis. Impugning the propriety of the generic divisions which have been founded on the number of the eyes, he maintains that three ocelli at each side is the constant number in various species to which more than this have been attributed; and he states the curious fact that in the *Scorpio europæus*, which has but two at each side when full grown, there are three with their distinct optic nerves in embryo; but two of these contiguous, and one of them subsequently disappears by abortion. Along with an ample liver, the scorpion possesses four filiform vessels inserted in the intestinal canal, two of which are ramified at the ends. The position of these accords so well with that of the Malpighian vessels in insects, that they probably constitute, as in them, the urinary apparatus; though Dufour, faithful to his preconceived opinions, will see in them nothing but biliary vessels, become superfluous and inefficient through the co-existence of a more energetic hepatic organ.

BRITAIN.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY; including Zoology, Botany, and Geology. No. 109, January; No. 110, February; No. 111, March, 1857, With Plates. London: Taylor and Francis.

No. 109. January.—(William Smith, F.L.S., Professor of Natural History, Queen's College, Cork) Notes of an Excursion to the Pyrenees in search of Diatomaceæ; with two plates. The particulars of this Tour will be found in the Transactions of the Dublin University Zoological and Botanical Association (*vide* Proceedings of Societies, page 12, etc.) This paper merely records the names of the Diatoms collected. Among them we find nine new species. A Epithemia was ound in a fresh water gathering made near the "Ville Eugénie," at Biarritz, and named after the amiable mistress of the place. (H. J. Carter. Assistant-Surgeon, H.C.S, Bombay) On the Development of the Root-cell, and its nucleus in Chara verticillata *Rosch;* with a plate. (L. Barrett, F.G.S.) On two new species of Echinodermata, new to the British Fauna; with a plate. One of the new species s a Comatula, C. Woodwardii; and the other an Amphidotus. A. gibbosus. (Richard Howse) Notes on the Permian System of the Counties of Durham and Northumberland; with a plate. (John Lycett) On the genus Quenstedtia. (Thomas Williams, M.D., F.L.S.) On the uses of the Sand-canal in the Starfishes. (Rev. P. B. Brodie, A.M.) Remarks on the inferior Oolite and Lias in parts of Northamptonshire, compared with the same formations in Gloucestershire. (J. Van der Hœven, M.D., &c., Professor of Zoology in the University of Leyden) Contributions to the knowledge of the Anatomy of the Nautilus Pompilius, *L.*, especially with reference to the male animal; with two plates. BIBLIOGRAPHICAL NOTICES. PROCEEDINGS OF SOCIETIES.—Zoological Society, February 26th; March 11th, 1856. MISCELLANEOUS.—Meteorological Observations and Table for November, 1856.

No. 110, February.—(Dr. C. F. J. Lachman) On the organization of the Infusoria, especially the Vorticellæ. (Rev. W. A. Leighton) New British Lichens; with a plate. (Thomas Williams, M.D, F.L.S.) On the so-called "Water-Vascular System." (C. Spence Bate, F.L.S.) A synopsis of the British Edrioph-

thalmous Crustacea. (Andrew Murray) List of Coleoptera received from Old Calabar, on the West Coast of Africa. (M. Fabre) Researches on the Development of the Myriapoda. Bibliographical Notices. Proceedings of Learned Societies. Zoological and Geological Societies. Miscellaneous. (F. Cohn) Observations on the organization and reproduction of the Volvocineæ. (Dr. E. K. Kane) List of Phænogamous Plants collected on the Western Coast of Greenland. (Professor Agassiz) Remarks on young bony Pikes. Meteorological Tables and Observations for December, 1856.

No. 111, March.—(Thomas Williams, M.D.) On the Mechanism of Aquatic respiration, and on the structure of the organs of breathing in invertebrated animals; with a plate. (W. H. Benson) Characters of Streptaulus, a new genus, and of several species of the Cyclostomacea, from Sikkim, the Khasia Hills, Ava, and Pegu. (Andrew Murray) Notice of a marked variety of Patella vulgata (proposed to be called var. intermedia), found in Guernsey and Jersey. (W. B. Carpenter, M.D., F.R.S.) On the structure of the Shell of Rhynchonella Geinitziana. (Dr. C. F. J. Lachman) On the organization of the Infusoria, especially the Vorticellæ; with a plate. (John Nietner, Colombo, Ceylon) Descriptions of new Ceylon Coleoptera. Proceedings of Learned Societies. The Royal and Zoological Societies and Bombay branch of the Royal Asiatic. (Margaret Gatty) New localities for rare plants and zoophytes. (W. Webster) Supposed new British species of Skenea. (P. Ducharte) Influence of moisture upon the Direction of Roots. (James Harlev) Migration of the Starling. (C. Spence Bate) British Amphipoda. (Philip Lutley Sclater, A.M.) Descriptions of some new species of Tanagers.

THE ZOOLOGIST. Nos. 171, 172, January; No. 173, February, 1857. 8vo. London: John Van Voorst. Price 1s. each.

No. 171, January. BIRDS.—(Murray A. Matthews) Stray Notes from an Ornithologist's Diary during the past Summer. (Lieut. T. Blakiston, R.A.) Birds of the Crimea. (Lieut. L. H. Irby, 90th Light Infantry) List of Birds observed in the Crimea. The whole value of a local list depends upon the care with which it is compiled and on the accuracy of the naming of the species. We have serious fault to find with Lieutenant Irby's List of Birds observed in the Crimea, because we think it deficient in both of these particulars. When we read of Birds recorded as being *seen* (not shot) by friends of his, we naturally ask what confidence can be placed in such communications, as it requires more practice than we think it likely Lieutenant Irby or his friends possessed to tell one-half the species recorded in this List as once seen, and that, too, when the author confesses towards the close that he does not include a skua-gull and a pelican, because they were only seen, not shot. Why, if this be right how could he identify the great northern diver which "was once seen in the harbour of Balaklava" and the guillemot which he "is informed has been once seen?" We heartily approve of Naturalists using both their own eyes and those of their neighbours as much and as often as they please, but we as heartily disapprove of their furnishing us with long lists of critical species which they, long-sighted creatures, fancy they had seen. It, of course, would not be right to assert that such and such Birds did *not* inhabit the Crimea, when we find a Naturalist of Lieutenant Irby's pretensions asserting they do. But in one instance, and that a conspicuous one, if the Rook (C. frugilegus) occurred only in that rookery which he mentions as being "near Sebastopol, on the road to Alouchta," there would be no evidence of its having occurred in the Crimea at all, as we are credibly assured, that the existence of a rookery in that situation is a complete mistake. (John J. Wilson) Occurrence of the Great Gray Shrike near Leeds. (John Joseph Briggs) The Hooded Crow; the Black Redstart. (Capt. H. W. Hadfield) Great abundance of the Pied Wagtail, &c. (H. Matthews) House Sparrow; Migration of the Swallow Tribe; Nidification of the Hedge Sparrow; Occurrence of the Avocet near Newark. (J F. Brockholes) Double Egg of Young Goose. (H. Stevenson) Beautiful Variety of the Common Woodcock. (J. F. Brockholes) The Teal breeding in Cheshire. (John

Joseph Briggs) The Little Auk. (E. N. Bloomfield) Explanation of supposed Phenomenon. Fishes.—(Rev. Alfred Merle Norman, B.A.) The Short Sun Fish and its parasite Cecrops Latreillii at the Channel Isles; The White Shark cast up at Herm; The Angel Fish in the Firth of Clyde; The Anglesey Morris at Falmouth. Mollusks.—(Rev. Alfred Merle Norman, B.A.) On the Maintenance of Molluscan Life in a very limited supply of Water, subjected to the exclusion of all Atmospheric influence. Insects.—(C. R. Bree) The Classification of the Deltoides and Pyralites of M. Guenée, with Remarks. (Rev. Joseph Greene, M.A.) On Pupa Digging. (H. T. Stainton) Entomological Botany (with more especial reference to the Plants that are frequented by the Tineina. —(Thomas Boyd) On Nomenclature. (R. F. Logan) Mr. Stainton's Arrangement of Lepidoptera. (C. S. Gregson) Figures of Larvæ of Lepidoptera. (Richard Weaver) Lasiocampa Callunæ. (George Harding, Arthur Naish) Double-broodedness of Notodontæ. (Thomas Chapman) The Notodontæ not double-brooded. (J. J. Reading) Capture of Glæa erythrocephala at Plymouth. (R. S. Edleston) Larva of Celæna Haworthii. (A. G. Hildebrand) Capture of Heliophobus hispidus in Leicestershire. (R. S. Edleston) Eupithecia indigaria. (C. Miller) Coleophora juncicolella; Butalis incongruella; Diplodoma marginepunctella; Nemotois cupreacellus; Tinea semifulvella; Crambus falsellus; Depressaria angelicella Larvæ of Nepticula at Bowdon, Cheshire; Captures of Micro-Lepidoptera at Darenth, &c., in 1856. (C. S. Gregson) Correction of an Error. (Benjamin Cooke) Captures of Diptera in the New Forest, Hampshire. (Frederick Smith) The Sovereign Bee. (W. C. Unwin) Capture of Halictus maculatus at Sandown, Isle of Wight. (Rev. A. Matthews) Capture of Peryphus fluviatilis and Tachys bistriatus. (Edward Parfitt) Description of a Species of Bledius new to the British List. (W. C. Unwin) Capture of Polystichus fasciolatus, &c., near Eastbourne, Sussex. (J. J. Reading) Intricatus to be exhibited alive. (Rev. William Hey) Captures of Hydradephaga at York. (Thomas John Bold) Note on Tomicus bidens, with a Description of Tomicus bispinus. Proceedings of Societies—Entomological Society. Radiata—(Rev. Sir Charles Lighton, Bart.) Inquiry respecting Serpula contortuplicata. (A. R. Wallace) Proceedings of Natural-History Collectors in Foreign Countries.

No. 173. February.—Quadrupeds.—(R. Knox, M.D., F.R.S.E.) Some Remarks on the Skeleton of the Head of the Urus Scoticus. (Rev. J. C. Atkinson, M.A.) Dreaming in the Canine Race. (Rev. A. R. Hogan) Musical Mice, but not Singing Mice. (Rev. Arthur Hussey, M.A.) Australian Field Rat. (Alfred Newton) Occurrence of the Barbastelle Bat in Suffolk and Norfolk. Birds.—(Lieutenant Thomas Blakiston, R.A.) Birds of the Crimea. (Henry Smurthwaite) Ornithological Notes from Leipzic. (Charles Barron) Occurrence of the White-tailed Eagle near Haslar. (Edward Hearle Rodd) The Black Redstart. (Captain H. W. Hadfield) The Greater Titmouse. (J. H. Gurney, M.P.) Anecdote of the predacious propensity of the Hooded Crow. (Rev. J. C. Atkinson, M.A.) Partridge and Hooded Crow; Partridge Swimming and Diving. (W. R. Rogers) Note on Pied Pheasants. (H. Stevenson) Occurrence of Sabine's Snipe in Norfolk. (Charles Barron) Note on the Osteology of Cariama. (William Thompson) Occurrence of the Canada Goose at Weymouth; Occurrence of the Egyptian Goose at Weymouth. (Lord Clermont) Occurrence of the Eared Grebe and Night Heron in Ireland. (Edward Hearle Rodd) Occurrence of the Forktailed Petrel near Helston. (William Thompson) Occurrence of the Forktailed Petrel at Weymouth. (Captain H. W. Hadfield) Occurrence of the Forktailed Petrel near Tunbridge. Fishes.—(Henry Deane) Fish pumped out of a dark Well. (Lester Lester) Two forms of Teeth in Sharks. (Henry Evans) Occurrence of the Short Sun-fish on the Coast of Galway. Mollusks.—A Schoolboy's Amusement in Southey's Days. Insects.—(Thomas Thorncroft) To Entomologists, Botanists, and others. Testimonial to the Rev Joseph Greene, M.A. (C. S. Gregson) On Pupa Raking. (Rev. Arthur Hussey, M.A.) Ravages of Caterpillars. (Rev. H. Harpur Crewe, M.A.) Mr. Stainton's Nomenclature in the "Manual;" Larvæ of Notodonta

dictæa, &c. (Henry Doubleday) Larva and Economy of Tæniocampa Populeti; Eupithecia helveticaria in Britain; Tortrix latiorana and Depressaria libanotidella. (J. F. Brockholes) Note on Cheimatobia autumnaria. (Robert S. Edleston) Early appearance of Phigalia pilosaria; Larva of Nepticula subbimaculella. (H. J. Harding) On the Habitats and Food-plants of several of the British Pterophoridæ. (Benjamin Cook) Description of an Œstrus new to Britain. Seems to be Cephenemyia trompe (Œstrus stimulator, Clark), the larva of which inhabits the frontal sinus of the Reindeer, and probably also of the Red-deer, as the fly is not rare in some parts of Germany, where the former of these is unknown. (Arthur Adams F.L.S., and William Balfour Bakie, M.D.) A Systematic List of Coleoptera found in the Vicinity of Alverstoke, South Hants. (Thomas John Bold) Note on Phytosus spinifer and Phytosus nigriventris; Capture of Anommatus 12-striatus in the North of England. PROCEEDINGS OF SOCIETIES—Entomological Society.

EDINBURGH NEW PHILOSOPHICAL JOURNAL; exhibiting a View of the Progressive Discoveries and Improvements in the Sciences and Arts. Edited by Thomas Anderson, M.D.; Sir W. Jardine, Bart.; and T. H. Balfour, M.D. No. 9. January, 1857: to be continued quarterly. 8vo. Price 6s.; with four Plates.

(Louis K. Dana) On the Tribual government of the Ruder Nations. (M. Camille Dareste) On the Animacules and other organized bodies which give a Red colour to the Sea (continued). (William Crowder) An attempt to determine the average composition of the Rosedale, Whitby, and Cleveland Ironstones. (Edward Hull, F.G.S.) Notes on the Basalts of the Giant's Causeway, County Antrim. (William Joy Henwood, F.R.S.) Notice of the Copper Turf of Merioneth. (George Wilson, M.D., F.R.S.E.) On the Physical Sciences which form the basis of Technology, being the introductory prelection for 1856. (Danie R. Rankin, Carluke) On the structure and habits of the Slow-worm (Anguis fragilis.) Proceedings of Societies—Among the Proceedings we find that of the British Association for 1856; and Professor Goodsir's Papers are given as revised by the author. 1. On the Morphological relations of the nervous system in the Annulose and Vertebrate types of organization. 2. On the Morphological constitution of the skeleton of the Vertebrate Head. 3. On the Morphological constitution of Limbs. In the first of these Papers, Professor Goodsir denominates a segmented animal, whether Annulose or Vertebrate, an Entomosome; to the constituent segments, with their diverging appendages, he applies the term Somatome; and as the constituent somatomes are invariably arranged in groups, in each of which they are more or less modified in form or fused together, he finds Syssomatome a convenient designation for such a group—for instance, a typical Crustacean presents a cephalic, a thoracic, and a caudal syssomatome, in each of which there are seven somatomes, twenty-one in all. Scientific Intelligence, &c.

THE PHYTOLOGIST. A BOTANICAL JOURNAL. Published Monthly. 8vo. London: W. Pamplin. With Plates. New Series. No. 18, October; No. 19, November; No. 20, December; No. 21, January; No. 22, February; No. 23, March, 1857. Price 1s. each.

No. 18. October.—(Joseph Woods, F.L.S.) On the genus Rubus. Botanical tour in the highlands of Perthshire. (Edwin Lees, F.L.S.) Cnicus Forsteri, *Smith*, in Worcestershire. Revised list of Craven Hieracia. (J. S. Mill) Reigate Plants. Reviews. Botanical Notes. Notices and Queries. Communications received. Books received for Review. Descriptive British Botany; eight pages.

No. 19. November.—(Dr. Lauder Lindsay) Notes on the Hartz Flora. Statistics of the order Cruciferæ. Botanical Notes. Notices and Queries. Communications received. Descriptive Botany; eight pages.

No. 20. December.—Notes from the Journal of an Irish Lady. (Joseph Woods) On the genus Rubus—Are Viola odorata and V. hirta distinct species? (J. G. Baker) On the Hieracia of North Yorkshire, and Report on the Isochimeral Temperatures. &c. (Rev. H. A. Stowell) Dates of Foliation and Flowering, &c. (Rev. W. T. Bree) On Dianthus cæsius at Chedder. (C. Barter) Rare Plants in

Aberdeenshire, &c. (J. G. Baker) On the Pansies of our Coast Sandhills. Review. Botanical Notes. Notices and Queries. Communications received.

No. 21. January.—The Editor's Address to the readers of the Phytologist. Botanical Tour in the Perthshire Highlands. (John Windsor, F.L.S.) List of Plants found near Settle. (J. G. Baker) On the Gormire Epilobium. (John H. Davies) Mosses in the Isle of Man. Botanical Notes. Notices and Queries. Descriptive British Botany; eight pages, with Title-page and Index of Volume I., New Series.

No. 22. February.—(Rev. W. M. Hind, A.M.) Three days at Killarney. Crossing the Purple Mountain, Mr. Hind discovered a very marked variety of Drosera longiflora; all the specimens being caulescent. The variety in question is figured. Botanical tour in the Perthshire Highlands. (David Moore, A.L.S.) Observations on the Mosses of Ireland, with a supplementary list of species not contained in the Flora Hibernica, together with their habitats. (Rev. Hugh Stowell, A.M.) Common Plants. Botanical Notes. Notices and Queries. Books received for review. Descriptive British Botany; eight pages.

No. 23. March.—(N. Jerdon) List of Fungi observed in the neighbourhood of Jedburgh. Botanical tour in the Perthshire Highlands. Asplenium germanicum in Somersetshire. (T. Kirk) Uncommon state of Pteris aquilina. Reviews. Phytologist: concluding part of Vol. V. Natural History Review—No. XIII. Botanical Notes and Queries. Descriptive British Botany; eight pages; and first eight pages of a general Index to the Phytologist, Old Series.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 96, January; No. 97, February; No. 98, March, 1857. 8vo. London: Lovell Reeve. With Plate. Price 2s. each.

No. 96, January.—Original Papers. (T. Oxley) The Banda Nutmeg Plantations. (Alphonse de Candolle) Sketch of the Life and Writings of M. de Martius. (Dr. Thomas Thompson) Notes on the Herbarium of the Calcutta Botanic Garden. (Dr. F. Mueller) Nova genera et species in Plagis Australiæ Intratropicis nuperrime detecta. Botanical Information. Notices of Plantæ Indiæ, Bataveæ Orientalis, and of Mettenius, Filices Lechlerianæ, Chilenses ac Peruanæ.

No. 97. February.—(Dr. Thomas Thomson) Notes on the Herbarium of the Calcutta Botanic Garden. (Alphonse De Candolle) Sketch of the Life and Writings of M. De Martius. (Dr. J. D. Hooker) Descriptions of two new Dillenaceous Plants from New Caledonia and Tropical Australia. (J. L. Soubreran) Some particulars respecting the Gums from Senegal. (M. Ch. Naudin) Observations on the formation of the Seeds without the aid of the Pollen. This description of generation concerning which this paper gives numerous details, is (M. Berthold Seeman says) best expressed by the term "Parthenogenesis," restricted, as has already been done entomologically by C. Th. E. Von Siebold, to the development of the ovules, without the agency of the male principle—the "Lucina sine concubitu" of the older naturalists—and not extended (as has been done by Professor Owen) to the process of germination observable in certain esexual viviparous bugs. M. Seeman has reviewed this question in two leading articles in the "Bonplandia," January 5th and February 1st, 1857. We would also refer our readers to a notice in our present number of Siebold's "Wahre Parthenogenesis bei Schmetterlingen und Bienen." Botanical Information. Notices of Books.

No 98, March.—(R. T. Lowe) On Ranunculus Creticus, cortusæfolius, and grandiflorus. (George Bentham) On Professor Nees Von Esenbeck's genera of Acanthaceæ, in De Candolle's Prodomus. (R. Caspary) On Udora occidentalis and Serpicula occidentalis. The valuable observations of Dr. Caspary settle the question of the assumed native origin of the Anacharis Alsinastrum *Bab.* in England, that plant being undoubtedly Pursh's Serpicula occidentalis, a species not found in Europe, or anywhere in the old world, though abounding in both temperate and tropical America. We are informed that Dr. Caspary is about to publish a revision of the Anacharidæ, and a monograph of the Nymphæaceæ, of the great value of which works we have little doubt. (B. Seeman, F.L.S., &c.) Revision of the genus Tanæcum. Botanical Information. Notices of New Books.

RUSSIA.

ARCHIV FUER WISSENCHAFTLICHE KUNDE VON RUSSLAND, herausgegeben von A. Erman. ERMAN'S ARCHIVES OF RUSSIAN SCIENCE. 8vo. Berlin.

Vol. XV. A.D. 1856.

(Radde) Animal life in the Putrid Sea—p. 251-281. (Baer) Studies of the Caspian Sea—p. 387-455. The depression of its level has been sudden; the question discussed whether the saline contents are increasing; the gulfs which are becoming more charged with salt, and the salt lakes formed at the expense of the sea and of the adjoining land. (Erman) The Climate of Tobolsk; continued from Vol. XII.—p. 603-667. Subterranean channel of the river Werkwa, in the Government of Wologda—p. 330, 331. State of the Forests in the Government of Kowno—p. 593-596.

MEMOIRES DE L'ACADEMIE IMPERIALE DES SCIENCES DE ST. PETERSBOURG. MEMOIRS OF THE IMPERIAL ACADEMY OF SCIENCE OF ST. PETERSBURG. Sixth Series. 4to. St. Petersbourg.

Vol. VII. Part 2, Natural Sciences. A.D. 1856.

(Brandt) Contributions to the study of the Mammalia of Russia; with nineteen plates—pp. 369. (Meyer) Small contributions to the study of the Flora of Russia—p. 1-24. (Ruprecht) On the Classification of the *Rhodophyceæ*; with a plate—p. 25-54. (Same) New or imperfectly known plants from the Northern part of the Pacific Ocean; with eight plates—p. 55-82.

VERHANDLUNGEN DER RUSSISCH KAISERLICHEN MINERALOGISCHEN GESELLSCHAFT ZU ST. PETERSBURGH. TRANSACTIONS OF THE IMPERIAL RUSSIAN MINERALOGICAL SOCIETY, for the years 1855, 1856. 8vo. St. Petersburgh. 1856.

(Barbeaut de Marny) Mineralogical novelties from the Ural—p. 197-206. (Fahrenkohl) A slight view of the Mountain limestone and the Jura in the neighbourhood of Moscow; with two plates—p. 219-236. (Gadolin) Observations on some Minerals from Pitkæranta in Finland; with a plate—p. 173-196. (Holmberg) Geognostical observations, Hydrographic and Orographic, in Northern Finland, as the results of the searches for gold there in the years 1847, 1848, 1850; with a map—p. 1-62. (Jeremejew) Geognostical observations on the banks of the river Wolchow—p. 63-84. (Kutorga) Note on certain positions of the rocks of Finland—p. 211-216. (Same) Note on a Fucus in the Silurian limestone of the Government of St. Petersburg—p. 217, 218. (Lawrow) Two new species of *Asaphus* from the Silurian limestone of the Government of St. Petersburg; with two plates—p. 237-240. (Meglitzky) Geognostical sketches of Eastern Siberia; I., Lake Baikal, and the country round it; with a map—p. 109-171. (Mendelejew) On Pyroxene from Ruskiala in Finland—p. 207-210. (Romanowsky) General Geognostical view of the South part of the Government of Rjasan; with a map—p. 85-107. (Kutorga) Reports of the Progress of Mineralogical Science in Russia; I., Report for 1854—p. 241-251.

SWEDEN.

FOERHANDLINGAR VID DE SKANDINAVISKE NATURFORSKARNES SJETTE MŒTE, O.S.V. REPORT OF THE SIXTH GENERAL MEETING OF SCANDINAVIAN NATURALISTS. Held at Stockholm, in July, 1851. 8vo. Stockholm. 1855.

ZOOLOGY.—(Liljeborg) Comparison of the Fauna of Scandinavia and of Northern Russia—p. 210-226. (Ibsen) Anatomy of the ear—p. 226-233. (Prosch) On the spouting of the Whale—p. 245-249. (Sundevall) On the muscular structure of the extremities in Birds—p. 259-270. (Kjærbœlling) On the importance of observations on the Migration of Birds, in order to a comparative estimate of the direction and period of them—p. 249-254. (Same) *Procellaria minor* n. sp. from Greenland—p. 254-256. (Malm) On the ventral fins of *Phycis*—p. 234-238. (Wahlberg) Sketches of Insect everyday life—p. 72. (Same) Observations on the Humble Bees of the North—p. 233, 234. (Prosch) On the capture of living

Nautili by Whale fishers—p. 256-259. (Mœrch) On the genus *Onustus*—p. 238-243. (Koren and Danielssen) Embryology of the Pectinibranchia—p. 256-259. BOTANY.—(Sandahl) Comparative view of the vegetation of Billinger and of Kinnekulle—p. 190-203. (Agardh) Remarks on *Saxifraga controversa*, and the species allied to it—p. 170-174. (Same) On the parts of the flower in the Salicinæ—p. 174-180. (Angstrœm) On the Swedish species of *Botrychium*—p. 181-190. GEOLOGY and PALEONTOLOGY.—(Nillson) On fossil bones of Whales found in the Swedish territory, and on a *Delphinus orca* stranded on the coast of Bleking, in the Spring of 1851—p. 55-64. (Retzius) The fossil bone of Luz—p. 270-274. (Weibye) On the phenomena of Friction in Scandinavia—p. 155-164. (Klee) Observations on the Alluvial Sandstone of Denmark—p. 145-155. (Igelstrœm) Geognostical and Mineralogical description of the Parish of Wermskog, and part of the adjoining parishes in Wermlandslæn—p. 123-145. MISCELLANEOUS.—(Worsaae) The utility of Antiquarian studies of Natural History—p. 39-48.

ACTA NOVA SOCIETATIS REGIÆ SCIENTIARUM UPSALIENSIS. TRANSACTIONS OF THE UPSAL ROYAL SOCIETY OF SCIENCE. New Series. 4to. Upsal.

Vol. I. Part II. 1855.

(Areschoug) New and imperfectly known species of *Phyceæ* collected in the seas out of Europe. (Forselles) An attempt briefly to characterize the Rocks according to the present state of Mineralogical science.

GERMANY.

ZEITSCHRIFT FUER DIE GESAMMTEN NATURWISSENSCHAFTEN U. S. W. redigirt von C. Giebel und W. Heintz. JOURNAL OF THE NATURAL SCIENCES in general, published by the NATURAL HISTORY ASSOCIATION OF SAXONY AND THURINGIA. 8vo. Halle.

Vol. VIII. July to December. 1856.

ESSAYS.—(Philippi) On the species of *Helix* indigenous in Chili—p. 89-93. (Same) On the Shells of the Straits of Magellan—p. 94-106. (Schmidt) List of the indigenous Mollusca of Northern Germany; with critical remarks—p. 120-169. (Same) On the *Baleæ*, and Balea-like *Clausiliæ* of Siebenburgen—p. 407-413. (Same) On the Organ of Hearing in the Mollusca; with two plates—p. 389-407. (Koehler) Minute chemical examination of the tongues of Gastropoda—p. 106-112. (Krœyer) On the Crustacean genus *Sergestes*—p. 413-418. (Same) On *Pachybdella*, *Peltogaster and Sylon;* parasitic genera of Crustacea—p. 419-622. Both essays extracted from the Proceedings of the Danish Royal Society for 1855. (Hoek) On *Calicotyle kroeyeri* Diesing, an intestinal worm from Raja batis; extracted from the Proceedings of the Swedish Academy, 1856—p. 507-512. (Gerding) Studies of the chemical constitution of Lichenes; with reference especially to the formation of the colouring matter in plants; extracted from Bley's Archives—p. 112-119. (Nillson) On fossil remains of Saurians and Fishes in the Chalk of Schonen; extracted from the Proceedings of the Swedish Academy, A.D. 1856—p. 504-507. (Giebel) The Chalk formation in Thuringia—p. 169-174. (Same) On the remains of Saurians and Fishes in the Keuper of Thuringia; with a plate—p. 422-429. The remains, found by Mr. Picard, belong to the following species—Nothosaurus cuvierii *Quenst.;* Amblypterus decipiens *Gieb.;* Saurichthys mougeoti, apicalis, acuminatus, *Ag.*; Hybodus tenuis, plicatilis, mougeoti, obliquus, *Ag.*; H. thuringiæ *n. sp.*; Acrodus gaillardoti *Ag.* (Eisel) On the Zechstein of the environs of Gera—p. 16-18. (Bruns) Analysis of the Lead dross from the smeltings of the Upper Harz—p. 495-499. (Kuhlemann) Analysis of some Minerals of the Upper Harz—p. 499-504. SHORT COMMUNICATIONS.—(Prosch) On the spouting of Whales—p. 514. (Schioedte) On a new species of *Niphargus* discovered in England; extracted from the Proceedings of the Danish Royal Society, A.D. 1855—p. 429-430. (Stenhammar) New Hortus siccus of Swedish Lichenes—p. 512-514. (Giebel) Geological synopsis of primeval Insects—p. 174-188. The author urges the importance of this long neg-

lected branch of Paleontological research, and compares the different formations in respect to the character and abundance of the fossil remains of this class in each. The richest and best preserved Fauna is that in the Amber, of which 1,100 species have been examined, and the number in collections probably amounts to 4,000 species at least. Next to this, in the number of species, seems to come the Tertiary formation, which Heer has done so much to elucidate. (Strombeck) On the Antiquity of the Flammen-mergel of North-western Germany—p. 349. Confirming, by new discoveries of fossils, the position of this rock as the most recent member of the Gault. (Soechting) Mineralogical Notes; with a plate—p. 289. (Weichsel) Mineralogical positions in the Lignite of Helmstedt and Seesen—p. 346-349. (Zinken) Sketch of the Geological structure of the district of Bernburg, with reference especially to the Petrifactions in the Bunter Sandstein—p. 344-346. (Zuchold) Biography of Leichhardt; continued—p. 189-203, 308-344.

Literary Notices.—Geology, Mineralogy, and Paleontology, an hundred and eight articles; Botany, nineteen; Zoology, forty-two. The full extracts and lists of species, given in many instances, make these notices very useful to the student of Natural History, as an Index to the contemporary progress of science in different countries.

Wuertembergische naturwissenschaftliche Jahreshefte. Annals of the Wuertemberg Association of Natural Science. 8vo. Stuttgart.

Vol. XII. Part III. 1856.

(Oppel) On the Jurassic formation of England, France, and South Western Germany—p. 313-556. Section III., the Upper Lias. Section IV., the Lias; Co-ordination of its several members; Comparison of the Systems of different Geologists; Limits of the Group. Section V., the Inferior Oolite.

Vol. XIII. Part I. 1857.

Memoirs.—(Rapp) Anatomical examination of the Manatus; with a plate—p. 87-98. (Finckh) Contribution to the Flora of Wuertemberg—p. 99-103. (Fraas) The Oolite in the white Jura of the Brenzthal—p. 104-107. (Schuler) On the grooved surfaces in the Iron ore of Wasseralfinger—p. 56-71. (Zech) The measurements of altitudes on the Wuertemberg Railway—p. 72-78. (Baur) Spherical curvature and Aerial reflection on the Lake of Constance—p. 79-86. Short Communications.—(Deffner) On the preservation of Petrifactions—p. 108. (Krauss) Occurrence of Vespertilio noctula in Stuttgart—p. 108. (Fraas) Critical notice of Bach's Geognostical chart of Germany and Switzerland—p. 109-112. Communications at the General Meeting.—(Luschka) On the fluid of the Graafian follicle—p. 24-28. (Schlossberger) Examination of Crystals in the Malpighian vessels of insects; of Calculi in the Organs of Bojanus in Pinna nobilis—p. 33. (Same) The chemical composition of the shells of the Mollusca—p. 29-33. (Guenther) *Abramis dobuloides*, a new fish of the river Neckar; with a plate—p. 50-54. (Paulus) Geographical range of Lacerta muralis—p. 54. (Quenstedt) On the fossil Gavial and Pterodactyle of Wuertemberg; with a plate—p. 34-43. (Schuebler) On the flow of Gas in the shaft of the Salt mine of Haigerloch—p. 44-50. (Kurr) Obituary of Dr. E. G. V. Steudel, the eminent Botanist—p. 17-24. Proceedings—p. 1-16.

Jahrbuecher des Vereins fuer Naturkunde im Herzogsthum Nassau. Annals of the Association of Natural Science in the Duchy of Nassau. 8vo. Wiesbaden. Part XI. 1856.

(Schulz) Contributions to the history of the Infusoria of the Duchy of Nassau; with a plate—p. 1-12. Of Infusoria, taken in the extent which Ehrenberg has given to the Class, 297 species have been recorded as the result of three years' observations, viz.—Rotifera, 51; Protozoa, 146; Desmideæ, 46; Diatomaceæ, 54. The present article is confined to an enumeration of the Protozoa, among which the author specifies as new *Paramecium planoconvexum, Trichoda striata, Trachelomonas acuminata;* all here figured along with some other doubtful forms. (Schenck)

Description of the Chrysidæ of Nassau, and an appendix containing the species of the rest of Germany—p. 13-89. There are described as new species, of Chrysis, 7 ; Holopyga, 2 ; Elampus, 1 ; Notozus, 4; of which many, according to the author's own admission, and judging from the characters assigned, probably far the greater part, may prove to be mere varieties of known species. The number of species found in the Duchy itself amounts to thirty. (Schenck) List of the Ants of Nassau, according to the arrangement of Mayr, being a supplement to the Description of the Ants of Nassau, in Part VIII. of the Annals—p. 90-94. (Same) On some irregularities of the cells of the wing in Hymenoptera—p. 95, 96. (Sandberger) Description of a variety of *Papilio podalirius;* with a plate—p. 97. (Fuckel) Additions and corrections to the List of the Phanerogamous plants and vascular Cryptogamæ of Nassau, in Parts VII. and VIII. of the Annals—p. 98-103. (Sandberger) List of the Hymenomycetous fungi of the Duchy of Nassau—p. 104-113. (Same) Geognostical sketch of the district of Reichelsheim ; with a map—p. 114-126. (Greiss) On the Magnetism of Iron ore—p. 127-144. Analysis of the Mineral springs of Weilbach, by Fresenius—p. 145-178. Of warm springs at Wiesbaden, by Kerner and Carl—p. 179-204. Of lamellar Silicate of Lime from Villmar, by Eglinger—p. 205-210. Of the ashes of Chrysanthemum segetum, by Bangert; with suggestions by Fresenius, for the extirpation of this troublesome weed by employing it in the manufacture of potash—p. 211-215. Proceedings, &c.—p. 216-241.

Abhandlungen der Naturforschenden Gesellschaft zu Halle. Transactions of the Society of Naturalists of Halle. 4to. Halle.

Vol. III. A.D. 1855, 1856.

Essays.—(Burmeister) Anatomy of *Coracina scutata;* with a plate—p. 191-212. (Schultze) Development of *Arenicola piscatorum*, and remarks on that of some other Annelids ; with a plate—p. 213-223. (Irmisch) Contributions to the Morphology of plants, No. V., VI. ; with three plates—p. 63-144. The subjects treated in these two parts are various Labiate plants ; also Smilacina bifolia, convallaria majalis, polygonatum, verticillata, and Paris quadrifolia. (Leichardt) Contributions to the Geology of Australia, communicated by Girard ; with two sheets of sections—p. 1-62. (Schweigger) Magnetism in its relation to Acoustics —p. 145-189. Proceedings—pp. 75. (Volkmann) On the true office of Muscular Elasticity—p. 57. (Burmeister) The characters of the species of Didelphis—p. 5. Characters of the genus Centurio—p. 28. South American species of Canis—p. 42-44. The Picinæ of Brazil—p. 31. The Trochilinæ of Brazil —p. 33. The Sphingidæ of Brazil, classification of the species—p. 58-74. (Schultze) Development of Petromyzon—p. 22-24. Structure of the gelatinous Disk of Medusæ—p. 1, 18-20. Propagation of Polythalamia—p. 35-39. (Schlechtendahl) On *Cibotium glaucescens* of druggists—p. 3. On *Sorghum saccharatum*—p. 7. *Polyporus rhytidodes*, n. sp., and on other species allied to P. fomentarius—p. 16. On the genus Krameria, which yields the Ratanhia root, and on a new sort of this ; with other Botanical notices—p. 24-26. On the date of the introduction into Europe of Datura—p. 26. The specific distinction of *Cotoneaster vulgaris* and *tomentosa*, and on some other species of this genus—p. 29. (Mueller) On accessory buds in Monocotyledonous plants—p. 45. On the arrangement of the leaves in various South American plants—p. 46-48. (Burmeister) On the species of Pterodactylus—p. 11-15. (Girard) Extinct Volcanoes of the Vivarais and Velay—p. 7. General views of the Trias—p. 8.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Proceedings of the Vienna Imperial Academy of Science. Math. Nat. Hist. Class. 8vo. Vienna.

Vol. XX. Parts II. and III. ; with twenty-nine Plates. 1856.

(Pelzeln) New and imperfectly known species of birds of the Imperial Museum ; with extracts from Natterer's MS. Catalogue of the Trogonidæ and Alcedinidæ,

collected by him in Brazil—p. 492-519. The principal new species are *Trogon chrysochlorus* and *Bucco striolatus*. *Trogon violaceus* Gmelin, which has been generally reduced of late as a synonym to T. viridis L., is here re-established. This species comes very near to T. caligatus *Gould*, but is larger and marked with black on the front, cheeks, and throat. *Alcedo venerata* Gmelin, a species which has been antiquated, is identified, on the authority of Latham's original specimen from the Leverian Museum, as the *Todirhamphus divinus* of Lesson. *Bucco ordii* Cassin and *Brachygalba melanosterna* Sclater obtain some further illustration, and *Urogalba amazonum* Sclater is identified with *Galbula paradisea*. (Heeger) On the metamorphosis of certain Diptera; with four plates—p. 335-350. The species illustrated are Lasioptera arundinis *Schiner*, Ceratopogon varius *Winnertz*, Lipara lucens *Mg.*, L. similis *Schiner*, Oxycera meigenii, and O. trilineata. It has escaped his notice that Perris has already published an account of the metamorphosis of Lipara. The earlier states of Oxycera also have not been hitherto quite unknown, as Heeger supposes, but he has given here the first description and figures of the larva, &c. (Ettinghausen) Notice of the work "Physiotypia plantarum austriacarum," by Ettinghausen and Pokorny; with ten plates and numerous intercalated figures—p. 407-491. This extract in itself will be a valuable text-book for students of Botany who cannot have access to the great work from which it is taken, and which consists of a quarto volume of text, and five hundred plates in five volumes folio, in which are represented nearly six hundred species of vascular plants of Austria, selected as representatives of the various modes of disposition of the veins in the leaves, &c., as a ground for systematic characters. (Fritsch) Periodical phenomena of vegetation in Austria for the year 1855—p. 371-391. (Rochleder) Notices in Organic Chemistry of plants—p. 527-530. (Lang) Crystallometry of Quartz; with four plates—p. 392-397. (Leydolt) On the Aerolite of Borkut in Hungary—p. 398-406.

Vol. XXI. Parts I. and II.; with thirty-one Plates. 1856.

(Rollett) Free termination of transversely-striated fibres in the interior of the Muscles; with a plate—p. 176-180. (Turck) Experimental investigation of the external sphere of Sensibility of the several pairs of Spinal nerves—p. 586-589. (Fitzinger) Classification and characters of the Natural families of Birds—p. 277-318. The author recognizes here, "as in all the other Classes of the Vertebrata," *five* parallel Series, each again resolved into *three* Orders. The first of these five among the birds is constituted by removing the *Psittacini* from among the *Scansores* in the second series to precede the Raptorial birds at the head of the Class. The same position Blainville also once assigned to his equivalent Order *Prehensores*. In the present part, Fitzinger has exhibited his proposed arrangement in detail, descending to the genera as far as the end of the *Ambulatores*, the second Order of the second Series *Leptopodes*. For this Order, so ample in its contents, he has admitted the subdivision into the two sub-orders *Gressorii* and *Conirostres*. He is not satisfied with the excessive multiplication of genera by some modern writers on Ornithology; accordingly we find here no less than twenty-five Synonyms reduced under *Fringilla*, eighteen under *Pipra*, and not much fewer under other genera. (Gycery) *Oxyuris spirotheca*, new species, from the intestine of Hydrophilus piceus; with a plate—p. 327-332. (Reichardt) On the central system of Vascular bundles in certain Umbelliferæ; with three plates—p. 133-154. From these observations it would appear that this system in the stems of the Umbelliferæ presents no such constant relations as in some other families of Dicotyledones, and affords only specific but not generic characters. On the other hand, the arrangement of the Vascular bundles in the leaves is constant and characteristic for the family. (Reissek) *Alphitomyces schrœtteri*, a new and singular fungus developed on a solution of Caseine; with a plate—p. 323-327. (Pokorny) Application of Nature printing to Microscopical objects of Botany; with a plate in duplicate—p. 6-18. The impressions for this purpose require to be taken on some surface more even than common paper. Glazed paper is employed here, and some of the figures admit of being examined with a magnifying power up to thirty lineal diameters. (Same) Application of the common Printing-press to nature printing from Botanical

subjects; with three plates—p. 263-268. The extreme simplicity of the means by which very delicate impressions are obtained not only in copper or pewter plates, but from the stereotype with a common printing press, deserves attention. (Haidinger) On hollow pebbles in the "Lauretta Conglomerate" of the Leitha limestone; with a plate—p. 480-491. (Oppel and Suess) On the probable Equivalents in Swabia of the Kœssen strata; with two plates—p. 535-549. The Brachiopoda and other deep sea species of the Kœssen strata gradually diminish in going westwards, and are replaced by other forms, mostly Pectinibranchia; but the Vertebrate remains determine the same Geological Period for this formation and the Bonebed of Swabia. Two new species, *Cypricardia suevica* and *Leda deffneri* are described and figured, along with other fossil shells characteristic of the Swabian Bonebed. (Laurenz) Analysis of fossil resin from Brandeisl in Bohemia—p. 271-275. (Filipuzzi) Analysis of the water of the Felsinea spring in Valdagno—p. 561-585. (Steer) Analysis of the fruit of Juniperus communis—p. 383-388. (Brucke) On the use of Canary glass for Microscopical Object-holders to neutralize the blue tinge of a clear sky—p. 430-432. (Fitzinger) Historical sketch of the Imperial Cabinet of Natural History of Vienna—p. 433-479. Obituary of Karl Haidinger —p. 319-322.

ZEITSCHRIFT DER DEUTSCHEN GEOLOGISCHEN GESELLSCHAFT. JOURNAL OF THE GERMAN GEOLOGICAL SOCIETY. 8vo. Berlin.

Vol. VII. Part IV. 1856.

(Huyssen) The Brine springs of the Chalk formation of Westphalia, their position and hypothetical origin; continued from page 252 before—p. 567-654. (Strombeck) On the occurrence of Rock salt in the Northern district of the Harz forest—p. 655-663. (Sonnenschein) On an Alliage of Lead and Iron in a blast furnace—p. 664. Proceedings and Correspondence—p. 547-566. Index—pp. 5.

Vol. VIII. Part I.; with eleven Plates. 1856.

Proceedings and Correspondence—p. 1-20. (Beyrich) The shells of the Tertiary formation of Northern Germany; Part IV., *Fusus, Turbinella;* with ten plates—p. 21-28. (Bornemann) On the Diluvial and Alluvial deposits of the district of Muelhausen, Upper Unstrutthal—p. 89-116. (Rose) On Carnallite, a new Mineral species—p. 117, 118. (Meyn) On a formation of Reefs on a small scale on the German coast of the Baltic—p. 119-126. (Suess) Observations on *Catantostoma clathratum* Sandberger—p. 127-131. (Von der Marck) Chemical examination of rocks of the Upper Chalk formation of Westphalia—p. 132-150.

ARCHIV FUER NATURGESCHICHTE U.S.W. WIEGMANN'S ARCHIVES OF NATURAL HISTORY. Continued by Troschel. 8vo. Berlin.

Vol. XXII. A.D. 1856, 1857.

Part I.—ORIGINAL COMMUNICATIONS.—(Mayer) The Anatomy of the Orang-utang and the Chimpanzee—p. 281-304. In addition to the properly Anatomical details, the author touches on the question as to the number of species of Satyrus, and proposes a new set of trivial names for them. In reference to the theory of the progressive development of animals in Geological periods, and the hypothetical descent of mankind from the monkeys, he remarks that in adducing, for the support of these ideas, the stages of lower organization through which the fœtus of Man and the Mammalia pass, it has been overlooked that at the very first origin of the human fœtus, the character of the higher type manifests itself predominant, since the noblest, that is the central parts of the nervous system, are developed the earliest, and are relatively largest then, the head exceeding all the rest of the body. (Blasius) On supposed new Mammalia of Europe—p. 258-280. A critical examination of new species recently proposed by Gerbe and Dehne. *Arvicola leucurus* Gerbe is referred to A. nivalis *Martins*, or Hypudæus alpinus *Wagner; A. selysii* Gerbe is a local variety of A. subterraneus; *A. ibericus* Gerbe, as well as *A. incertus* Selys, a local variety of A. savii, probably. Dehne's imper-

fect descriptions make it more difficult to judge of his species from them alone. *Sorex chrysothorax* D. is probably Crocidura leucodon ; Reichenbach, however, is disposed to refer it to C. thoracica ; *Micromys agilis* D., not distinct from Mus minutus *Pallas ; Myoxus speciosus* D., probably M. avellanarius; and *Musculus mollissimus* D., nothing more than a common white mouse. (Kaup) Synopsis of the families, genera, and species of Eels—p. 41-77. To make the order *Apodes* a natural one, Kaup considers it necessary to restrict it to the families Ophisuridæ, Anguillidæ, Murænidæ, Congeridæ, and Synbranchidæ, thus excluding the Gymnotidæ and Leptocephalidæ, as well as Ophidium and Ammodytes. The genera Alabes, Saccopharynx, and Gymnarchus are also excluded; as to their true systematic place the author is not yet decided. The Gymnotidæ he considers as constituting the lowest form of the Order Physostoma, the genus *Sternarchus*, as the highest organized of the family, being assimilated to the Salmonidæ in certain points of structure. The Leptocephalidæ, in like manner, hold the lowest rank in the Order to which the Esocidæ belong, a genus of this family, *Esunculus*, from the Mediterranean, presenting the other characters of the Leptocephalidæ, but possessing ventral fins. (Same) Synopsis of the family Gymnotidæ ; with figures —p. 78-87. (Same) Synopsis of the sub-family Ophidinæ—p. 93-100. As *Fierasfer dentatus* Cuvier varies much in the dental formula, Kaup concludes that Echiodon drummondii *Thompson* is not distinct from that species. Fierasfer imberbis *Cuvier* should bear the name *F. acus*, Gmelin's trivial name being the oldest that applies to the species, since Ophidium imberbe L., which Montague has figured in the Transactions of the Wernerian Society, does not even belong to the same genus. (Same) On the swimming bladders of *Carapus inæquilabiatus* Valenciennes ; and Note by Troschel ; with figures—p. 88-92. It appears that two species not easily distinguishable from each other outwardly, yet differ in the number of these organs, that named having three swimming bladders, while *C. fasciatus* has only two, the ordinary number. (Moebius) Comparative view of the nests of the social Wasps; with a plate—p. 321-332. A summary of an essay on the same subject more at large, published by the author in the third volume of the Transactions of the Natural History Society of Hamburgh. (Gerstæcker) Carcinological essays ; with three plates—p. 101-160. Contain many valuable observations on the characters of various genera of Malacostraca, and a critical determination of the species of Herbst, from the originals, now mostly extant in the Berlin Museum. The following new genera are characterized and figured :—*Peloplastus*, n. g., of fam. Oxyrrhyncha ; P. *pallasii*, n. sp. Cyclometopa, *Chalæpus*, n. g., Cancer trispinosus *Herbst ; Polycremnus*, n. g., C. ochtodes *Herbst ;* both species doubtingly referred by Milne Edwards to the genus Panopæus ; *Euctenota*, n. g., E. *exasperata, mexicana*, n. sp. Catometopa, *Rhaconotus* n. g., R. *crenulatus* n. sp. Astacini, *Scytoleptus* n. g., S. *serripes* n. sp., South African. Sphæromidæ, *Monolistra* n. g., M. *cœca* n. sp. from the Carniolan caverns. The following are new species of other genera :—*Micippe miliaris* from the Red Sea ; *Trapezia corallina, subdentata, Lupea exasperata, pudica ; Gelasimus excellens*, allied to Acanthoplax insignis *Edw. ; Dilocarcinus pardalinus ; Telphusa subquadrata*, Philippine Isles. Lambrus carenatus *Edw.* is the true C. pransor *Herbst*, and L. prensor *Edw.* is renamed *L. edwardsii*. There is some difficulty in determining which of two very similar species of Ocypode is the true Cancer ceratophthalmus *Pallas ;* but his figure and the habitat are in favour of the species figured by Desmarest as *O. ceratophthalmus*, and to which C. cursor *Herbst* belongs. The other species, which M. Edwards appears to have confounded under the same name, stands here as *O. ægyptiaca*. O. pallidula *Dana* may very probably be the young of the former species, as the black markings are common to all of this genus at a younger age. Uca una and lævis *Edw.* should be united as male and female of one species. Dilocarcinus castelnaui *Edw.* is Cancer septemdentatus *Herbst ;* Cancer hydrodromus *Herbst* Telphusa grapsoides *Edw.*, and C. aurantius *Herbst* T. leschenaultii *Edw.*, so far as Milne-Edwards's brief descriptions admit of a judgment being formed. (Leuckart) Notes on the Medusæ of the sea of Nice ; with two plates—p. 1-40. A valuable contribution both to the Anatomy and Natural History of Coelenterata. The following new genera are characterized, *Calyptra*,

having some similarity to Thaumantias, but hardly referable to any of the established families,—C. *umbilicata* n. sp.; *Phialidium* allied to Thaumantias, P. *viridicans* n. sp.; *Pyxidium truncatum* n. sp., a singular form and difficult to assign the place of; *Paryphasma planiusculum*, separated from Æquorea by the form and structure of the arms, but described from specimens which had not attained their full development. Thaumantias corollata, Oceania coccinea, Euphysa globator, Steenstrupia lineata, Cunina moneta, C. costata are *new species*. (Gegenbaur) Studies of the Organization and Classification of the Ctenophora; with three plates—p. 163-205. A general review of what is known of this obscure group, with some new contributions to the history of their development, and to the classification. The family Callianiridæ is the most imperfectly known, and is placed at the head of the class provisionally only. Of Calymnidæ a new genus is characterized, *Eurhamphœa*, with one species, E. *vexilligera*, new; of Cydippidæ, a new species *Cydippe hormiphora*. To the families Cestidæ and Beroidæ there are no additions. Finally, the author describes a new form, *Sicyosoma rutilum*, which he considers as representing the lowest type of the Ctenophora, wanting both the natatory plates and the vascular system found in the rest of the Order. EXTRACTS AND TRANSLATIONS.—(Peters) On the genus *Mormops* Leach; from the Proceedings of Berlin Academy, 1856—p. 305-309. (Kinberg) New genera and species of Annelida; from Proceedings of Swedish Academy, 1856—p. 310-320. (Loven) Development of Chiton; from the same—p. 206-210. (Steenstrup) The structure of the Hectocotylus in Argonauta and Tremoctopus, illustrated by observations on similar structure in the Cephalopoda in general; from the Transactions of the Danish Royal Society, 1856; with two plates—p. 211-257.

VERHANDLUNGEN DES NATUR-HISTORISCHEN VEREINES DER PREUSSISCHEN RHEINLANDE UND WESTPHALENS. TRANSACTIONS OF THE NATURAL HISTORY ASSOCIATION OF PRUSSIAN RHINELAND AND WESTPHALIA. New Series. 8vo. Bonn. Vol. III. 1856.

GEOLOGY, &c.—(Von Dechen) The forest of Teutoburg, a Geognostical Sketch—p. 331-410. (Von Hoiningen) The Pyrites and Barytes deposits of Meggen on Lenne; with map and sections—p. 300-330. (Sandberger) Slight notes on the Paleontology and Geognosy of the Rhenish provinces; with a plate—p. 292–299. *Clymenia subnautilina* described and figured; like the other species of this genus a characteristic fossil of the Cypridine slate; locality Kirschofen, in the Duchy of Nassau. Goniatites restrictus *Eichwald* is a variety of *G. retortus*, viz., Var. 12, undulatus; see the New Annals of Mineralogy, A.D. 1851. (Wolff) Tables of altitudes in the Circle of Wetzlar, the Principality of Birkenfeld, and the Barony of Meissenheim; with an Appendix by Von Dechen—p. 99-152. (Zeiler) On the phenomena of Erosion in the Rhenish district—p. 1-11. BOTANY.—(Beckhaus) Contributions to the Cryptogamous Flora of Westphalia; with a plate—p. 12-28. Continued from Vol. II. The present part includes the Hepaticæ, sixty-one species, and Lichenosæ, 175 species. (Karsch) Note on the Flora of Westphalia—p. 163, 164. ZOOLOGY.—(Goldfuss) List of the Land and Freshwater Mollusca of Westphalia known up to the present time, and observations on the tongue, mandibles, and erotic darts; with six plates—p. 29-86. The species enumerated amount to 138, arranged under thirty genera, of which sixteen are terrestrial, and fourteen aquatic. A probably new species of Arion is figured, as well as A. ater, hortensis, Limax maximus, cinereoniger, marginatus, sylvaticus, agrestis. (Kaltenbach) The Phytophagous Insects of Germany—p. 165-265. A compilation of his own observations and those of other authors, after the pattern of Macquart's Catalogues in the Memoirs of the Scientific Society of Lille; the species being enumerated under the plants on which they feed, and the latter in Alphabetical order. The present portion extends from Acer to Atropa. (Mayer) On the penetration of the egg by the Spermatozoids; with two plates—p. 266-292. Suggesting various questions, both of observation and theory, concerning this process, especially in the cases where the egg shows no micropyle, and instituting a comparison between the reproductive organs in the animal and the plant. MISCELLANEOUS.—(D'Alquen) On the Microscope—p. 86-98. PROCEEDINGS of the Association,

List of Members, &c.—pp. 70. (Assmann) Proposal to institute observations on Periodical phenomena in the class of Insects—p. 4-12. (Wilms) On the specific distinction of *Taraxacum palustre*, and on a hybrid between this species and T. officinale—p. 49-58. (Marquart) On the importance of *Polygonum sieboldii*, a plant introduced from Japan, as fodder for cattle—p. 54. (Kueper) On the coal formation of Westphalia—p. 56-58. PROCEEDINGS OF THE SOCIETY OF PHYSICAL AND MEDICAL SCIENCE OF THE LOWER RHINE, meeting at Bonn—pp. 111. (Mayer) Notices in Comparative Anatomy—p. 60-62. (Same) On the species of Orang Utangs—p. 87-92. (Same and Siebold) On edible swallows' nests—p. 31-34. (Schaaffhausen) On the accelerated development of frogs by artificial warmth—p. 49. (Troschel) On the swimming bladders of the Gymnotini—p. 65. He found only the usual number, two, in *Carapus fasciatus*, while Dr. Kaup has discovered three in *C. inæquilabiatus*, a species so like as not to be easily distinguished from this. (Same) On the teeth of the Heteropod Mollusca—p. 24. (Albers) On the worms which infest the human liver—p. 6. (Schaaffhausen) On *Monas okenii*, an Infusory which communicates a red tinge to water—p. 67. (Siebold) Catalogue of the Japanese plants and grains cultivated in the establishment at Leiden—p. 65-67. (Schaaffhaussen) On the fungus which causes the "blood stains" on spoiled meats—p. 49. (Caspary) Discovery of Zoospores in a species of *Chroolepis*, confirming the views of those authors who have placed this genus with the Algæ—p. 83. (Same) On Peronospora devastatrix, the fungus which constitutes the potato disease—p. 94. (Same) On the change of structure and constitution of wood long buried under ground—p. 82. (Weber) On the Anthracite Flora of the Lower Rhine—p. 3. (Nœggerath) Notice of Warren's work, "the Mastodon giganteus of North America"—p. 13-15. (Same) On an abundant deposit of the bones of *Hypudæus* in the Diluvium of Eifel—p. 101. (Same) Occurrence of Harmotome in the Siebengebirge—p. 101. (Same) Transition of Sparry into Magnetic Iron ore—p. 67. (Same) Occurrence of Pholerite in the Rhenish provinces—p. 37. (Same) Amorphous black Diamond of La Chapada in Brazil—p. 5. (Burkart) On native Gold and Cinnobar, Quicksilver, and other minerals of California and Mexico—p. 15-20. (Same) Localities of Meteoric Iron in Mexico—p. 40-48. (Same) Basalt dyke of the mine Johannissegen—p. 102. (Same) Extent of the Anthracite and Sphærosiderite formation on the right bank of the Sieg—p. 104-107. (Von Dechen) Geological Map of Rhenish Westphalia—p. 22. (Same) Bach's Geological Map of Germany, Switzerland, and the adjoining countries—p. 52-55. (Rath) On the composition of Phonolite—p. 83. (Same) Crystal of Quartz invested with a secondary deposit of crystals—p. 96. (Argelander) Notice of the United States Astronomical Expedition to the Southern Hemisphere, in the years 1849 to 1852—p. 56-60.

MONATSBERICHT DER K. PREUSSISCHEN AKADEMIE DER WISSENSCHAFTEN ZU BERLIN. PROCEEDINGS OF THE ROYAL BERLIN ACADEMY OF SCIENCE. 8vo. Berlin.

Vol. XX.; for the year 1855.

(Pflueger) On a system of nerves controlling the Peristaltic motions of the Intestines—p. 489-491. (Peters) Specific characters of the marine fishes of the South-east coast of Africa—p. 428-469. (Same) Specific characters of new Curculionidæ of Mozambique, by Gerstæcker—p. 83-85. Of new Coleoptera of Mozambique, by the same—p. 265-269, 636-639. Of new Staphylinii and Lamellicornia, by Klug—p. 644-660. Of new Diurnal Lepidopetra, by Hoppfer—p. 639-643. Many new genera of Coleoptera are briefly characterized in the preceding articles. (Same) On Myriapoda, especially those of Mozambique—p. 75-83. (Mueller) On *Sphærozoum* and *Thalassicola*, and a new genus *Acanthometra*. (Same) On the Polycystineæ observed in the Port of Messina—p. 671-676. (Caspary) On the development of heat in the flowers of *Victoria regia*—p. 711-756. (Same) On some Hyphomycetes with two and three sorts of fructification; with a plate—p. 308-333. (Ehrenberg) On Microscopic animals from Mont Rosa remaining alive after four years desiccation—p. 225.

(Pringsheim) On the fructification of Algæ; with a plate—p. 133-165. (Cohn) On the Propagation of *Sphæroplea annulina*—p. 335-351. (Ehrenberg) Production of the marble of the County Antrim, in Ireland, out of Polythalamian Chalk, by volcanic heat—p. 9-12. (Same) On well preserved Polythalamia in the Zeuglodon Limestone of Alabama—p. 86-90. (Same) Further illustrations of the Greensand as casts of Polythalamia, and on the bottom of the Ocean at 12,900 feet depth—p. 172-179. (Same) Illustrations of the organization of Polythalamia from their primeval casts—p. 272-290. (Same) On a marine bed of Polythalamia in Europe, and on disguised Polythalamia in the Tripoli of Virginia and Simbirsk—p. 292-305. (Same) On the successful preparation of entire casts of Nummulites—p. 487-489. (Same) On a method of communicating transparent colours for Microscopic purposes to the colourless siliceous particles of organic bodies—p. 552-559. (Same) Examination of the organic matters in discoloured streams, and in the matter ejected from Volcanoes—p. 551-578. (Same) On the claret-coloured rain that fell in the Canton of Zurich on the 14th and 20th of November, 1855—p. 764-777. (Same) On the progress of the Supplement to Microgeology, and on Microscopic life in the Southern States of N. America—p. 779-783. (Schultze) On the occurrence of Cellulose in a state of good preservation in Lignite and common coal—p. 676-678. (Ewald) Studies of the Lowest Lias in the district of Magdeburg and Halberstædt—p. 1-5. (Magnus) Water contents of Vesuvian—p. 548-552. (Weiss) Remarks on the Rhomboedric system of Crystals—p. 7-9. (Rose, G.) Pearled Lime a Pseudomorphosis of Arragonite—p. 707-710. (Rose, H.) Fallow copper ore of Poratsch, in Hungary, containing Quicksilver—p. 447. (Same) Composition of Beryl earth—p. 581-584.

Vol. XXI.; for the year 1856.

(Koelliker and Mueller) Motions produced by electricity in the heart of the Frog—p. 145-148. (Schultze) On the terminations of the Olfactory nerves; with a plate—p. 504-514. (Lichtenstein) Specific identity of *Cervus mexicanus and virginianus*, and specific distinction of *C. richardsonii*—p. 617. (Peters) On the Systematic place of the genus *Mormops*, Classification of Phyllostomata, New species of *Vampyrus*—p. 409-415. (Same) *Amblyodipsas*, a new genus of Snake from Mozambique—p. 592-595. (Peters) *Tænia gigantea*, new species from the intestines of the Rhinoceros—p. 469. (Same) Supplement to the Annelides of Mozambique—p. 654. (Schneider) Motions in the seminal corpuscles of the Nematodea—p. 192-197. (Lieberkuhn) Parasitic sacs on the larvæ of Insects—p. 220-221. (Mueller) Observations on Infusoria—p. 389-398. (Same) On the Thalassicollæ, Polycystineæ, and Acanthometræ, of the Mediterranean—p. 474-503. The author retains Meyen's name *Sphaerozoum* for the compound form *Thalassicolla punctata* Hurley. Another compound form, with reticulated shells, he calls *Collosphæra;* the name *Thalassicolla* being retained for the solitary forms, such as *T. nucleata* H., distinguished from Polycystinea by the absence of a siliceous shell, and from Acanthometra by not possessing siliceous spicula. Two new species of *Sphaerozoum* are noticed. Several new forms of Polycystineæ are characterized, *Lithocircus*, *Cladococcus*, *Acanthodesmia*, *Dictyosoma*, and many new species. Of *Acanthometra* fourteen species are distinguished, and *A. arachnoides* Claparède constitutes a new genus *Plagiacantha*. Many observations on the structure and movements of these creatures are added; but of the mode in which they take food nothing is yet ascertained. In one case the interior of an Acanthometra was seen full of little particles in lively motion, from an examination of which Mueller is inclined to think that the young resemble the parent, except in wanting spicula and in their activity. (Schacht) Fructification of Phanerogama, exemplified in *Gladiolus segetum*—p. 266-279. (Same) On the origin, structure, and distribution of the vessels containing the milky juice in *Carica papaya;* with two plates—p. 515-534. (Klotzsch) On the position of the genus *Ouvirandra* in the Natural system—p. 71-73. (Same) Conversion of *Avena sativa* into *A. fatua*—p. 444. (Caspary) On the growth of the leaf of *Victoria regia*—p. 22-26. (Karsten) Organography of *Zamia muricata*—p. 648-652. (Braun) On Parthenogenesis in plants—p. 434-436. (Same) Five New species of *Chytidrium*, with

notes on other species, and on the allied genus *Rhizidium*—p. 587-592. (Schacht) On the structure and development of *Corallinæ*—p. 261. (Pringsheim) Fructification and alternate generation of Algæ—p. 225-237. (Ewald) On the Rudistes found on the Northern borders of the Harz—p. 596-599. (Mueller) On new Crinoidea of the Eifel Limestone—p. 353-356. (Same) On an Echinoderm, with scale-shaped plates and the spines of an Echinid, in the Eifel Limestone—p. 356-361. (Ehrenberg) On the organic forms of the Ocean at 1,600 feet of depth—p. 197-201. (Same) On Microscopic life in the Central plain of Africa—p. 323-338. (Same) On the continuation of "Microgeology"—p. 362-364. (Same) On the nature of a substance that fell in China, darkening the air—p. 393. (Same) On two new rocks of organic composition; a white Halibiolite Tripoli from Chili; and a volcanic eatable Tripoli from Honduras—p. 425-431. (Rammelsberg) Composition of Leucite, and the Pseudomorphoses of it—p. 148-153. (Same) Crystallography and composition of the Vanadin Lead ore—p. 153. (Same) Composition of Leucophane and Melanophane, and some new combinations from the salt mine of Stasfurt—p. 202, 203. (Same) On Zoisite and the composition of Epidote—p. 605-617. (Rose, G.) On the thick Boracite of Stasfurt—p. 75-79. (Same) Structure and stratification of the rocks in the Riesengebirge and Isergebirge—p 444-449. (Same) Description of the new Diamond of the Royal Mineralogical collection—p. 652. (Mayer and V. Neimanns) Account of the Earthquake observed at Cairo, in October, 1856—p. 471-473.

Flora oder Allgemeine Botanische Zeitung u. s. w. Flora, Universal Botanical Journal; published by the Royal Bavarian Botanical Society of Ratisbon; edited by Dr. A. E. Furnröhr. New Series. 8vo. Regensburg.

Fourteenth Annual Volume; with eight Plates. 1856.

Original Essays.—(Vogel) On the relation between Light and Vegetation —p. 385-388. (Jaeger) On the comparative harmlessness of injuries of the stem and leaves to the development of these—p. 65-72. (Wydler) Morphological notices; with three plates—p. 33-48. (Sendtner) On the Embryology of the Vegetable kingdom—p. 657-667. (Dippel) On the disputed question of the Primordial Sac; with a plate—p. 257-268, 273-281. Concluding, against the doubts of Pringsheim, in favour of Mohl's views of this. (Same) On the propagation of *Vaucheria;* with a plate—p. 481-488, 497-512. (Wigand) Contributions to vegetable Teratology; with a plate—p. 705-719. (Same) Examples of Anomalous formation of the woody substance; with a plate—p. 673-681. (Guembel) Embryology of *Viscum Album;* with a plate—p. 433-436. (Irmisch) Natural History and development of *Thelygonum cynocrambe*—p. 689-698. (Schultz, C. H.) Catalogue of Cassiniaceæ collected by Jardin, in the islands of the Pacific—p. 353-362. (Sendtner) The Bavarian species of Rubus—p. 193 205. The Brambles, truly a field of thorns, afford a sort of "test objects" of the Botanist's powers of discrimination between species and varieties; without correct notions of which Botanical Geography can scarcely exist as a science. The author of this essay follows chiefly Arrhenius and Godron, and admits into the list for Bavaria—in addition to the four old Linnean species, the following—*R. suberectus* And., *glandulosus* Bell., *fuscus*, *radula*, *macroacanthus*, Weihe, *tomentosus* Borckh., *vulgaris* Weihe, *nemorosus* Hayne; while he reduces the great majority of Wirtgen's and Weihe's new species. (Schultz, F.) *Anemone junhae* n. sp. from Transylvania—p. 205. (Buchenau) Note on *Sorbus hybrida*—p. 1-4. (Same) On a Monstrosity of the flower in *Dipsacus fullonum*—p. 389-393. (Wolfner) *Thesium carnosum* n. sp., and *Th. macranthum* Presl., Bohemian plants—p. 561. (Martrin-Donos) *Glaucium aurantiacum*, n. sp. of the Narbonese, and Diagnoses of the allied species—p. 171. (Lehmann and Schnittspahn) *Sempervivum tomentosum* n. sp. of the group Arachnoideæ—p. 56-59. (Heuffell) The Hungarian species of *Knautia*—p. 49-56. (Caspary) On the daily period of growth of the leaf of *Victoria regia*, and of plants in general—p. 113-126, 129-143, 145-160, 161-171. (Koernicke) Notes on the genus *Crocus*—p. 465-478. (Schultz, F.)

On the species of *Gagea* indigenous in France—p. 363-366. (Same) On the right of priority in respect to the varieties of several species of plants—p. 517. (Hochstetter) Critical remarks on some exotic genera of grasses, and the species referred to them; continued from the volume for 1855—p. 17-29, 81-95, 97-112, 177-192. The subjects are the following genera—*Trisetaria* Forsk., compared with Deyeuxia *Beauv.*, and Anomalotis *Steud.*; *Crinipes* Hochst., its nearest affinities Ectrosia *R. Br.* and Tripogon *Roth*; *Harpachne* H., nearest affinity to Uniola *L.*; *Heteranthelium* H., related to Secale *L.*; *Amblyachyrum* H.; *Heteropogon* Pers.; *Elionurus* Willd.; *Ischæmum* L., its relation to Meoschium *Beauv.*, Spodiopogon *Trin.*, Sehima *Forsk.*, Hologamium *Nees.*, Arthraxon *Beauv.*, Bathratherum *Nees*, Pleuroptilis *Trin.*, Lucaea *Kunth*, Colladoa *Cav.*, Alectoridia *Rich.*, and the frequent confusion among these genera; *Dimeria* R. Br., to which Haplachne *Presl.*, and Psilostachys *Steud.* are reducible. (Boeckeler) New American Carices; *C. tenuispica, triangularis, leucocarpa;* with notes on some other species—p. 225-231. (Same) Critical remarks on some Carices described as new species in Steudel's Synopsis of Cyperaceæ——p. 321-329. *C. brazasana*, St., has been previously described as *cherokeensis* Schweinitz; *C. aureolensis* St., a form of *C. stenolepis* Torr.; *C. microsperma* St., is *flaccosperma* Dewey; *C. gracilescens* St., *oligocarpa* Schkuhr; *C. subcompressa* St., *meliacea* Mühl.; *C. amphibola* St., a marked form of *C. anceps; C. rufidula* and *macrokolea* St., form one species; *C. subbiflora* St., not distinct from *lucorum* Willd.; *C. watsoniana* and *kelvingtoniana* St., both belong to *C. acuta* Mühlenberg. (Arnold) List of the Musci Frondosi of the Franconian Jura—p. 241-250. (Massalongo) On some Collemaceæ of the tribe Omphalarieæ—p. 209-215. New genera, *Corinophoros*, *Arnoldia*. (Same) On *Thamnolia*, a genus of Lichenes imperfectly characterized—p. 231-235. (Same) New genera of Lichenes—p. 281-286, 289-292. Spolverinia, Tomassellia, Mycetodium, Sarcosagium, Maronea, are the new generic names. (Nylander) Critical remarks on the Natural History of Lichenes—p. 577-579. (Fries) Attempt to determine some of the species of Schaeffer's "Icones Fungorum Bavariæ et Palatinatus"—p. 369-373. (Hasskarl) Remarks on some plants in the Botanic garden of Buitenzorg and the branch of it at Tijpanuar in Java—p. 513-516. (Steudel) Contributions to the Flora of Chili and Peru, principally from the collections of Bertero and Lechler—p. 401-412, 417-426, 436-444. (Landerer) On the Medicinal plants of Greece—p. 305-317. (Same) Botanical observations in Greece—p. 449-458, 647-652, 753-756. (Wolfner) Critical remarks on various new, rare, or doubtful plants of the Bohemian Flora—p. 337-394. (Kirschleger) On floating plants, and other notes on the Rhenish Flora—p. 529-536. (Bamberger) Remarks on some Swiss plants introduced into his List for this year—p. 737-739. (Vulpius) The Latreien Alp in the Canton of Bern—p. 545-550. (Same) Excursion to the Gasterenthal in the Canton of Bern—p. 551-559. (Same) Excursions in the summer of 1856—p. 720-725. (Fürnrohr) Proceedings of the Section of Botany and Vegetable Physiology, of the Thirty-second Meeting of German Naturalists and Physicians held at Vienna, in September, 1856—p. 593-607, 609-624, 625-639, 641-647.

Reviews, twenty-nine. Repertory of Periodical publications; giving the contents of fifty-four different works of this class. Botanical Notices extracted, fifty-one. Collections of dried plants, thirty-eight. Notices of Scientific Societies and Institutions, &c.

Neueste Schriften der Naturforschen den Gesellschaft in Danzig. Transactions of the Danzig Society of Naturalists. N. S. 4to. Danzig.

Vol. V. Part IV. A.D. 1856.

(Liévin) On the "Dud" or Fezzan worm; with a plate—pp. 10. This minute Crustacean abounds in the Natron lakes of Fezzan, where it was first observed and described by Dr. Oudney (Denham and Clapperton's Narrative of Travels and Discoveries in Northern and Central Africa—p. 58), after whom Dr. Baird has

named the species *Artemia oudneyi*, from drawings sent home by Dr. Vogel. Liévin has described it here from specimens communicated by Dr. Petermann, which, though they had lain many years in spirits, have afforded materials for a pretty complete description of the external anatomy, correcting Dr. Vogel's sketches in some points. The author agrees with Grube that *Artemia* Leach is not a natural genus, and accordingly refers the species to *Branchipus*. (Same) On the Monsoons in the Indian Ocean; with two charts—pp. 42.

HOLLAND.

VERSLAGEN EN MEDEDELINGEN DER KONINKLIJKE AKADEMIE VAN WETENSCHAPPEN. PROCEEDINGS OF THE DUTCH ROYAL ACADEMY OF SCIENCE. Class of the Natural Sciences. New Series. 8vo. Amsterdam.

Vol. III. Part III. 1855.

ESSAYS.—(Brantz) On a mutual connection between the medullary rays by means of parenchyma, which forms a continuous network of cells containing nutritive matter, in the wood of the Angiospermous Dicotyledones; with a plate—p. 344-371. (Vrolik) Biographical notice of De Haan—p. 399-408. (Harting) On the minute circular currents arising in mixtures of water with volatile fluids—p. 445-464. PROCEEDINGS.—(Donders) On Hæmodynamic—p. 323-327. (Vrolik) On the origin of Double Monsters—p. 327-331. (Breda) Notice of the fossil remains of a *Zeuglodon* smaller than *Z. hydrarchos*, in the Tertiary basin of East Gelderland—p. 290-293.

Vol. IV. 1855, 1856.

ESSAYS.—(Halbertsma) On a mode of connection between the muscles *Latissimus dorsi* and *Triceps* in man, analogous to the *Anconæus quintus* in other Mammalia; with a plate—p. 238-246. (Same) On the relation between the Subclavian artery and supernumerary Cervical ribs in man; with three plates—p. 247-258. (De Vriese) Description of the flower of *Dryobalanops camphora*—p. 201. (Same) On Triandrism in *Phajus*; a contribution to the Morphology of the Orchideæ; with a plate—p. 95-100. (Lacoste) On the Hepaticæ of Java; Extract—p. 201-207. PROCEEDINGS.—(Van der Kolk) On the structure and function of the Medulla spinalis oblongata—p. 290-293. (Harting) Remarks on De Ville's experiments to determine the source from which the Azote in plants is derived—p. 151-161. (De Vriese) Note on the Camphor tree of Sumatra and Borneo—p. 183. Report of Committee on the best plan for completing the Geological Survey of the Netherlands, commenced and suspended—p. 295-310.

VERHANDELINGEN DER KONINKLIJKE AKADEMIE VAN WETENSCHAPPEN. TRANSACTIONS OF THE DUTCH ROYAL ACADEMY. Fourth Series.

Part III. A.D. 1856.

(Halbertsma) On Hermaphroditismus spurius femininus; with two plates—pp. 18. (Van der Hoeven) On the genus *Icticyon*; with a plate—pp. 10. Burmeister, in his Systematic Synopsis of the Animals of Brazil, has referred the genus *Icticyon* Lund (*Cynalicus* Gray) to the Mustelidæ, on the ground of its having only one tubercular grinder on each side in both jaws. Van der Hoeven here vindicates its position among the Canidæ, with which it agrees better in other characters, showing that the number is not constant in that family. Thus, in *Otocyon* there are four tubercular grinders in the upper jaw and three in the lower; in *Canis azaræ*, three above and two below; in *C. alpinus* (as Gray has already stated), there are two in the upper, but only one in the lower jaw; the same is the case with *C. sumatranus*, Gray, which is, probably, identical with *C. rutilans* Temminck, in one specimen only of which last Van der Hoeven found two in both jaws, while five other specimens showed but one in the lower jaw. (Same) Contribution to the Anatomy of Nautilus pompilius, and especially of the male; with five plates—pp. 29. Appended is a Microscopical examination, by Boogard, of the Spermophora of the male. The whole essay forms a most instructive supplement to Owen's admirable work. Had

Steenstrup's recent observations on the development of the Hectocotylus in the Decapod Cephalopoda, as well as in the Octopods, appeared sooner, it is scarcely to be doubted that Van der Hoeven would have been led by them to recognize distinctly a corresponding arrangement in the Tetrabranchia. Troschel, who has inserted this present essay, translated, in the Archives of Natural History, Vol. XXIII., remarks, with apparent reason, that the Spadix of the male Nautilus, composed of four connate tentacles, presents an analogue of the Hectocotylus arm. He considers the structure also to favour the views of Valenciennes, who has compared the eight labial processes to the arms of the Dibranchia, and the tentacles of the Tetrabranchia to the suckers in that order.

Natuurkundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem. Transactions of the Scientific Society of Haarlem. Natural Sciences. Second Series. 4to. Haarlem.

Part XII. Prize Essays. A.D. 1856.

(Schultze) The Embryology of *Petromyzon planeri*; with eight plates—pp. 50. The careful and minute observations of the author on the early stages of development of this Lamprey, compared with those of Remak on the Embryology of the Frog, reveal many points of agreement between the two, and differences from what we know in respect to other fishes. These differences partly result from the mode of segmentation of the vitellus, which is *total*, as in the Amphibia, and accompanied by the appearance of a cavity of segmentation, to which we know as yet of nothing quite analogous in other fishes; the embryology of the cartilaginous fishes, however, seems to require further examination with reference thereto. There is an analogy to the frog again in the first formation of the alimentary cavity; and the inner Epithelium of the secondary, and not of the primary cavity, is clothed with cilia, which are persistent ultimately, as Leydig had before observed. Other differences between Petromyzon and fishes in general are connected with its very simple organization; thus the eye appears first at a late period, and as a simple pigment spot, and the brain presents originally no trace of divisions. The observations ended with the first indication of the cranial cartilages, and too early to trace the stages through which the eye attains its perfect organization in Petromyzon. Other singularities in the development are the remarkable gland of the lower jaw (Glans thymus), and the Ciliary organs under the Chorda above the heart.

Both the prize essays in this part are written in German, although published in the Transactions of a Society in Holland.

Handelingen der Nederlandsche Entomologische Vereeniging. Transactions of the Entomological Association of the Netherlands. 4to. Leiden. Vol. I. Part IV. 1857.

Report of the Twelfth Annual Meeting of the Association at Leiden, in July, 1856—p. 79-109. Principally taken up with an essay by Van Bemmelen on the instances recorded of great flights of insects of different orders, but especially Neuroptera. *Libellula quadrimaculata* has composed the chief of those noticed in the Netherlands. Mulder criticized Bouche's description of the larva of *Elater segetis*. The correct description and figure which Curtis has given of it in the Reports of the English Royal Agricultural Society appears unknown to the censor, not having been cited in the Catalogue of Coleopterous Larvæ by Chapuis and Candèze. Graaf gave an account of the ravages of *Cryptorrhynchus lapathi*, which attacks willows and poplars; also of the varieties of *Libellula quadrimaculata*. De Gavere noticed the peculiarities of the Insect Fauna of Groningen. Maitland described an intestinal parasitic mite, *Gamasus saccicola*, inhabiting the abdomen of *Xylocopa latipes* in Java.

DUTCH INDIA.

Natuurkundig Tijdschrift voor Nederlandsch Indie. Journal of Natural Science for Dutch India. New Series. 8vo. Batavia.

Part IV. A.D. 1854.

(Krajenbrink) Matter, Force, Life, and Spirit; a contribution to the Develop-

ment theory. (Altheer) Origin of the edible birds' nests. (Bleeker) Ichthyology of the Cocos islands.—Synopsis of the Ichthyology of Sumatra; with descriptions of new species.—On fishes that live in starfishes, and on a new species of *Oxybeles*. —Fishes of the Natoena islands.—Ichthyological observations made in journeys through the Residency of Banten.—New fishes of the Cocos islands.—Ichthyology of Batjan.—Characters of new or imperfectly known species of Javanese Fishes.—Sixth contribution to the Ichthyology of Celebes.—*Dactylopterus cheiropthalmus*, a species from the Banda islands.—Something more on the Fishes that live in Echinoderma. Characters of new Mollusca of the Indian Archipelago. (Filet) Second Catalogue of plants cultivated in the Botanical Garden of the Grand Military Hospital at Weltevreden. (Korthaals) On the Chrysobalaneæ of Dutch India. (Fromberg) Results of the Sugar-cane cultivation in the Eastern division of Java. (Chatin) On the Java tea. Gutta Percha of Borneo. Gum Elastic of Borneo and Java. Discoloured water of the Chinese seas. (Wijers) Analysis of the wood of *Saprosma arborea*. (Torminger) On the Cassava of the West Indies, and Analysis of three samples. (Kuijpers) On the Sulphur of Sumatra. (Mayer) Analysis of Mineral water from the Solfatara of the Gœnoeng Wayang. (Bensen) On a Solfatara in the Northern part of the Residency of Banten. (Altheer) Analysis of the Mineral water of the same Solfatara. (Everwyn) Searches for coal in Western Borneo.—On the position of the Gold mines of Landok. (Schreuder) Search for Lignite in the island of Celebes, &c. (Hart) On the strata bored through for an Artesian well at Macassar. (Arriens) Ascent of the Kloed Volcano in September, 1854. (Hagemann) On the great eruption of the Kloed Volcano in May, 1848. (Seijff) On the warm springs in an inlet of St. Nicholas Bay, on the North coast of Bali island. New islet thrown up in the neighbourhood of the Key islands. Earthquakes in the Indian Archipelago. Contributions to the Geology and Mineralogy of Dutch India. Mining operations of the Corps of Engineers. Proceedings of the Society of Natural Science of Dutch India.

Part V. A.D. 1855.

(Doleschall) Vocal organ of *Platydactylus guttatus*. (Bleeker) Ichthyology of Borneo; eighth article.—Ichthyology of the Cocos islands; third article.—*Antennarius lindgreeni*, n. sp., from Banca.—Ichthyology of Ternate; fifth article.—Ichthyology of the Batoe islands.—Fishes of the Thousand islands.—Fishes of Tikoe, west coast of Sumatra.—Ichthyology of Amboina; sixth article.—Ichthyology of Celebes; seventh article.—Ichthyology of the Cocos islands; fourth article. Index to the species of Fishes of Malaja and the Moluccas described in the Eighth Volume of the Journal of Natural Science of Dutch India; with the particular localities. New Mollusca of the Indian Archipelago. (Ross) Review of Darwyn's theory of the formation of Coral. Flora of the Indian Archipelago, new species. (Hasskarl) Notice of the work "Plantæ Junghuhnianæ." (Fromberg) Effects on climate produced by the diminution or eradication of the forests. (Altheer) On *Arachis hypogœa*. (Pant) History, Culture, and Manufacture of Indigo. (Smits) The Diamond Mines of the East coast of Borneo. The Copper ore of Batjan. (Croockewit) Analysis of Pozzolani earth from Welira mountain, in East Java. (Altheer) Analysis of the deposit from the warm spring of Sigoriti. (Seijff) Visit to Bator Volcano in Bali island. Summary of the Volcanic phenomena in Java in 1854. Earthquakes in the Indian Archipelago; at Batavia, in March, 1855; at Brakoe, in Engano island. Mining operations of the Corps of Engineers.

Part VI. A.D. 1855.

(Bleeker) Ichthyology of the Batoe islands; second article.—Ichthyology of Sumbaya; new notices.—Ichthyology of Halmaheira, in Gilolo; new notices.—Ichthyology of Batjan; second article.—Gleanings of the Ichthyology of Sumatra: The Fishes of Lahat and Sibogha.—Ichthyology of Celebes; eighth article.—Notice of some collections of Fishes from East Java.—Ichthyology of East Java; ninth article.—Ichthyology of Borneo; ninth article, the fresh-water fishes of Pontianak and Bandjermassin.—Ichthyology of Great Aby island.—Ichthyology of Batjan; third article. (Pant) On Influence of the cultivation of Indigo on that

of Rice. (Croockewit) On the cultivation and manufacture of Sugar, and the occurrence of the Sugar-cane in West Borneo. (Fromberg) Analysis of samples of Sugar-cane, &c. (Wijers) Analysis of the Caranna resin. (Tormingen) Analysis of Guano from the Grotto Poetjakwangi, in the district of Grissee. (Fromberg) On the same. Notices of the Geology and Mineralogy of Dutch India. Anthracite on the borders of Batavia and Bantam. (Mulder) Analysis of Coal from Mew Bay. (Mayer) Analysis of the water of the Artesian well in the Coral island Onrust; and notice of the strata bored through there.—Analysis of the mineral water of the Solfatara Kawa Manuk. (Altheer) Analysis of mineral water from the Straits of Bali, and from the Residency of Pasoercean. Earthquakes in the Indian Archipelago. Influence of Earthquakes on the Magnet. Mining operations of the Corps of Engineers. Proceedings of the Society of Natural Science.

BELGIUM.

BULLETIN DE L'ACADEMIE ROYALE DES SCIENCES DE BELGIQUE. BULLETIN OF THE ROYAL BELGIAN ACADEMY OF SCIENCE. 8vo. Bruxelles.

Vol. XXIII. Part II. A.D. 1856.

(De Selys-Longchamps) Further instances of Hybrids of the family Anatidæ; supplementary to the list in Vol. XII. of this Bulletin—p. 6-22. (Van Beneden) On a shower of worms, Mermis nigrescens—p. 3. (Same) *Epibdella sciænæ*, a new Trematode; with a plate—p. 502-508. (Same) On two species of Trematodes, *Octobothrium merlangi* and *Axine bellones*; with a plate—p. 643-653. (Schwann and Gluge) Report on an essay by Udekem on the development of Infusoria—p. 159-163. (Melsens) On some properties of the grains of Starch—p. 663-665. (De Koninck) On the distribution of certain Carboniferous fossils—p. 309-311. (De Vaux) On the position and formation of Oligist, Limonite, and Pyrites—p. 69-73. (Perrey) On the Earthquakes that occurred in 1855, with supplementary notices for previous years—p. 23-68.

MEMOIRES DE LA SOCIETE ROYALE DES SCIENCES DE LIEGE. MEMOIRS OF THE ROYAL SOCIETY OF SCIENCE OF LIEGE. 8vo. Liége.

Vol. IX. A.D. 1854.

(De Selys-Longchamps and Hagen) Monograph of the Calopterygini; with fourteen plates—pp. 291. *Libellula virgo* of Linnæus constituted the type upon which Leach founded the genus Calopteryx, and from this has been taken the name of one of the two sub-families into which the Agrionidæ are subdivided. The sub-genus *Calopteryx*, composed of the species which group themselves most closely about that type, is the widest in its geographical range of all the forms in the sub-family, extending into the temperate regions, and this both of the old world and the new, while no other sub-genus is in common to both of these, nor any single species, even of that group, unless it be *C. splendens*, which is said to have been received from Georgia. Of the genera themselves, in the wider sense, five in number, which compose the sub-family, two only (*Calopteryx*, *Euphœa*) are represented in both hemispheres, two of the others (*Amphipteryx*, *Thore*) being confined to America, and one, *Libellago*, to the Eastern hemisphere. One hundred species of the Calopterygini are described here. The majority of all the groups belong to the warmer regions of the globe. Southern Asia and South America are richest in species; but the apparent comparative deficiency in respect to Africa may be explained by our imperfect acquaintance with that continent. Oceania proper affords no representative of the group, and Europe itself possesses but three, all belonging to the sub-genus *Calopteryx*, unless for a fourth *Euphœa fatime* is taken in, which passes over from its habitat in Asia Minor to the opposite shores of the Bosphorus. Of those three, one belongs to the countries bordering on the Mediterranean, while two, *C. virgo* and *C. splendens*, attain to the British Islands, and the first extends even into Lapland. The present is intended as the first of a series of Monographs in which the learned authors propose to treat in succession the several

families of the Odonata Fabr., or the genus Libellula of Linnæus. The arrangement given here, and in the previously published Synopsis of the Calopterygini, (which serves to complete the present work), is based chiefly on the veins of the wing. It is a striking illustration of the systematic importance of the characters thence derived, that such are applicable not only to the classification of the Orders and Families in which the ramifications of the veins are few, and their relations simple, but to a case where the multiplication of the secondary veins and the minute subdivision of the network seems at first to present extreme complexity, and a variety without end. It is a subject for keen regret that no general system of nomenclature for the veins and included areolets has yet been established by common consent among Entomologists. It is not merely that a different set of names are in use in respect to the several Orders, but that there is little agreement between the various writers on the same Order. When we compare the terms respectively used by Harris, Jurine, Latreille, Kirby, Meigen, Fallen, De Romand, Lefebure, Herrich-Schæffer, De Selys, Heer, Burmeister, Fieber, Walker, and others, we find ourselves involved in the bewildering task of acquiring as many distinct dialects almost. It would be a praiseworthy concert of the special votaries of the Hymenoptera, Diptera, Lepidoptera, Neuroptera, Hemiptera, and Coleoptera severally, to bring all their vocabularies into a common stock, and mutually to sacrifice their private partialities to the rule of priority and analogy, where other reasons may seem to fail. But this is a digression. In the present notice we have referred to the genera in the sense in which Dr. Hagen views them, his coadjutor De Selys being disposed rather to elevate to that rank the whole of the twenty-five sub-genera into which he has divided them; and this he has done pretty nearly, in fact, by the mode of nomenclature which he has employed. He avows himself to have been always before opposed to the excessive multiplication of genera; but a deeper study, as he states, has led him here to change his views. Probably there are few students of Natural History who have concentrated their attention on a single group that have not experienced something of a similar operation of mind in their own case, even while their judgment on the general principle may have remained unaltered, as it applied to other groups, and to the views of other Naturalists. It might be thought that he who has studied a group most thoroughly should be best qualified to appreciate the characters which denote generic distinction therein; but it may be urged, on the other hand, that one who has a general and more indifferent acquaintance with a large class of natural objects will be likely to judge more impartially of the purpose and the requisites of scientific nomenclature, framed as it is, or should be, for the very facility of generalization chiefly, whilst a "mononymic nomenclature" even may suffice the student of species and their distinctions.

Vol. X. A.D. 1855.

(Dufour) Belostoma algeriense *n. sp.*, and remarks on the genus; with a plate—p. 186-198. The remarks chiefly regard the respiratory system, and the structure of the antennæ, with the singular cavity in the interior of the eye, in which these organs are lodged. (Lucas) *Micipsa* n. g. of Coleoptera; with a plate—p. 294-298. Heteromerous, allied to Tagona; the single species *M. rufitarsis* Luc., from the French possessions in Northern Africa. (Perris) History of the Metamorphosis of various insects; with two plates—p. 233-280. The species here illustrated are Coleoptera, Liodes castanea, Cryptohypnus riparius, Tarsostenus univittatus, Ebæus albifrons, Agapanthia suturalis, Dircæa levigata, Sphindus gyllenhallii, Lagria hirta, L. lata, Hispa testacea, Gryphinus piceus, and two Diptera, Cecidomyia entomophila *n. sp.*, and Platystoma umbrarum. (Drouet) List of the recent Land and Freshwater Mollusca of continental France—p. 137-185. The species enumerated in this carefully compiled list amount to 220 Pulmonata, 40 Pulmobranchia, and 35 Pectinibranchia—or 295 Gastropoda in all—and 45 Acephhala. Notes on the characters of various new or obscure species are added, and references to the species heretofore included in the Fauna of France which the author has not been able to determine satisfactorily. (De Koninck) Davidsonia woodwardiana *n. sp.*; with a plate—p. 281-287. Davidson's figures of the two other species of

this genus are also copied into the plate, and an error rectified in the references he has given, the figures 186 and 187 of Plate VIII. having been designated as D. verneuillii, instead of D. bouchardiana, in the original.

FRANCE.

MEMOIRES DE L'ACADEMIE IMPERIALE DES SCIENCES DE L'INSTITUT DE FRANCE. MEMOIRS OF THE FRENCH ACADEMY OF SCIENCE. 4to. Paris.

Vol. XXVII. Part I. 1856.

(Dumeril) Analytic Ichthyology, or Classification of Fishes according to the Natural method, by means of Synoptical Tables—pp. 511. This work is like a parting gift of the veteran author, who resigned, in the course of the last year, the chair of comparative Anatomy he had filled so long and worthily. The weight of eighty-four summers, lightly as they sat upon his honoured brow, could not be unfelt, and the task of maintaining the scientific reputation of a name so widely celebrated has devolved upon his son and successor. The first chapter of the volume before us, extending to sixty pages, comprises a sketch of the Natural History and Physiology of the class; the second treats of the general principles of the classification, in the compass of twenty-two pages; the rest of the volume being given to the details. In comparing the arrangement with that expounded in the "Analytical Zoology" of the author fifty years since, we are struck by the almost total change of the nomenclature employed for the higher and intermediate groups, not by adopting the received names, but by the introduction of another set of compounds, which it is to be presumed the author considered as recommended by euphony and expressiveness. A change that meets us in the classification at the outset, is the separation of the Cartilaginous fishes into two sub-classes, equivalent, under other names, to the orders Cyclostomi and Plagiostomi; while all the Osseous fishes constitute the remaining sub-class, divided again into four orders corresponding to the ancient divisions of Apodes, Jugulares, Thoracici, and Abdominales, but disguised under the double aliases of Apodes or Acatopes, Propodes or Anteropes, Hemisopodes or Mediopes, Opisthopodes or Posteropes.

ANNALES DES SCIENCES NATURELLES. ANNALS OF THE NATURAL SCIENCES, ETC. Fourth Series. 8vo. Paris.

ZOOLOGY. By MILNE EDWARDS. Vol. V., A.D. 1856. (Marfels) Investigation of the mode in which minute solid particles pass from the intestine into the interior of the chyle and blood vessels—p. 134-164. (Schrœder van der Kolk and Vrolik) Examination of the Vascular plexus in different animals; with a plate—p. 111-133. (Milne Edwards) Note on the dimensions of the blood globules in certain cold blooded Vertebrata—p. 165-167. (Jacquart) On the measurement of the Facial angle, with a description of a new Goniometer—p. 283-294. (Gervais) Materials for a Monograph of the Chiroptera of South America —p. 204-223. (Vulpian and Philipeaux) Notes on the Heart, Liver, and Lungs of an Elephant—p. 183-204. (Dareste) Note on the Brain of Apteryx—p. 48-50. (Dufossé) Hermaphroditism the normal condition in the genus *Serranus;* with figures—p. 295-332. The author considers that he has established this fact in respect to the three species *S. scriba*, *cabrilla*, *hepatus*. (Mueller) On the development of the Lamprey; translated from Mueller's Archives of Anatomy, &c.—p. 375-388. (Nylander) Synopsis of the Formicidæ of France and Algeria; with a plate—p. 51-109. Sixty-eight species are admitted, viz., Formica 35, Polyergus 1, Ponera 1, Typhlopona 1, Myrmica 29, Strongylognathus 1. Of these the Typhlopona, with two species of Formica, and as many of Myrmica, are found in Algeria, but not in France; while six of Formica and three of Myrmica are natives of Algeria and Southern France in common. Further investigation will doubtless detect many more species in the Southern provinces. The number of species diminishes in going northwards. The neighbourhood of Paris produces 31 species; nineteen of which, at least, extend into the Southern provinces, while twenty-one of them are natives of Northern Europe. The entire number of species found in the British islands is only twenty-seven. (Schiœdte) Observations on

viviparous Staphylinidæ domesticated in the nests of South American Termites, forming two new genera Corotoca and Spirachtha; translated from the Transactions of the Danish Royal Academy; with a plate—p. 169-183. (Lespès) On the organization and habits of the Termes lucifugum: with three plates—p. 227-282. The winged individuals are of two sorts; the small kings and queens (males and females) are disclosed about the middle of June; the large kings and queens—in the last of which alone the abdomen acquires the enormous enlargement so often signalized by travellers in other exotic species of this family—come out in Autumn. The *soldiers* and *workers*, which never acquire wings, are individuals of each sex, in which the organs of generation are abortive; and they scarcely differ from each other except by the greater development of the mandibulæ and their muscles in the former. Regularly, but one queen remains in each nest of this species. As Mr. Lespès' observations do not fully agree with the statements of some observers and travellers in other countries, it would be premature to apply the conclusions drawn from this species to all the rest. (Same) On *Isakis migrans*, a Nematoid worm parasitic in the Termes lucifugum; with figures—p. 335, 336. (Faivre) Comparative Histology of the Nervous system in certain Annelides—p. 337-374. The common Leech is the subject of this chapter; the essay is to be continued in the following volume. (Marcel de Serres) Reply to Shuttleworth's letter on the genus *Stoa*—p. 168. (Lacaze-Duthiers) Essay on the development of the branchiæ of the Mollusca Acephala Lamellibranchiata; with a plate—p. 5-47. Notices of new books—p. 110, 224-226, 332-334.

Botany. By Brongniart and Decaisne. Vol. V., A.D. 1856. (Mohl) Remarks on the composition of the Liber of plants; translated from H. v. Mohl and Schlechtendahl's "Botanical Journal;" with a plate—p. 141-159. (Payen) On the immediate composition of the Epidermis and epidermic cuticle of plants—p. 160-162. (Radlkofer) On the development of the Embryo in Phanerogamous plants; with a plate—p. 220-250. Euphrasia odontites and Lathræa squamaria are the special subjects of these observations, and the author applies himself particularly to combat the views of Schacht. (Prillieux) On the structure of the hairs of the Oleaceæ and Jasmineæ; with two plates—p. 5-14. (Same) On the anatomical structure and mode of vegetation of *Neottia nidusavis*; with two plates—p. 267-282. (Same, and Riviere) Observations on the germination and development of an Orchid, *Angræcum maculatum*; with three plates—p. 119-140. (Fabre) On the germination of the Ophrydeæ, and the nature of their Tubercles; with a plate—p. 163-186. (Godron) On *Aegilops triticoides* and its different forms—p. 74-89. (Tulasne) Note on the multiple reproductive apparatus of the Hypoxyleæ or Pyrenomycetes—p. 107-118. (De Bary) On the sexual generation of Algæ—p. 262-266. (Pringsheim) On the fecundation and alternate generation of Algæ; translated from the Proceedings of the Royal Academy of Berlin; with a plate—p. 250-261. (Cohn) On the development and mode of reproduction of *Sphæroplea annulina*; translated from the Proc. R. Acad. Berlin; with two plates—p. 187-208. (Same) Observations on the Volvocineæ, and on the organization and propagation of *Volvox globator* in particular—p. 323-333. (Cosson) Account of a Botanical Expedition in Algeria, continued; with a map—p. 15-74. (Same) On the genus Hohenackeria, and description of a new species *H. polyodon* from Algeria; with two plates—p. 137-140. (Chatin) Essay on the family Tropæoleæ; with three plates—p. 283-322. (Oudemans) On the morphological and anatomical structure of the fruit of the Camphor tree of Sumatra, *Dryobalanops camphora*; with a plate—p. 90-106. (Derbes) Description of a new genus and species of Florideæ, *Ricardia montagnei*, and observations on some Algæ; with a plate—p. 209-220. (Montagne) Seventh century of new cellular plants indigenous and exotic—p. 334-374. Chiefly from Weddel's South American collections, viz.:—7 species of Hepaticæ, 64 Hymenomycetes, 2 Discomycetes, 3 Pyrenomycetes, 1 Gasteromycetes, and 1 Haplomycetes; of which the diagnoses are given in anticipation of the full descriptions in Weddel's two works now in course of publication. The remainder are mostly European fungi.

REVUE ET MAGAZIN DE ZOOLOGIE, ETC. REVIEW AND MAGAZINE OF ZOOLOGY, Scientific and Practical. By Guérin-Méneville. 8vo. Paris.
Vol. VIII.; with Twenty-five Plates. 1856.

ORIGINAL ARTICLES. VERTEBRATA.—(Guérin-M.) Note on the Aye-aye, *Cheiromys madagascariensis;* with a figure from the living animal—p. 312-314. (Aucapitaine) Note on the African Mouflon, *Ovis ornata* G. St. Hilaire—p. 3-6. (Loche) Description of *Zorilla vaillanti* n. sp. from Algeria; with a plate—p. 497-499. (Pucheran) Sketch of the Mammalogy of Africa, concluded—p. 49-55. (Same) Notes on Mammalogy: Cetacea; with a figure of *Delphinus marginatus* Duvernoy—p. 145-149, 315-321, 362-369, 449-460, 546-552. (Same) Cercopithecus erxlebenii, Cynocephalus doguera, n. spp.—p. 96. (Rousseau) On the dentition of Cetacea, and the position of the whalebone in the mouth of the Balænæ—p. 193-208, 257-260, 305-311, 353-369. (Bonaparte) Inaugural address to the Meeting of Ornithologists at Cothen—p. 292-295. (Same) *Serresius galeatus*, new genus and species of pigeon, of the Marquesas Islands; with a plate—p. 401-403. (Bourcier) *Pygmornis amaura, Thalucrania coelina*, n. spp. of humming birds from New Granada—p. 552, 553. (Souancé) Catalogue of the perroquets of the collection of the Duke of Rivoli, with observations on some new or imperfectly known species of Psittacidæ—p. 56-64, 152-158, 248-226. Psittacara hahni, chloroptera, maugei; Chrysotis chloronota, coccineifrons; Psittacula cyanopygia; Pœocephalus aubryanus; Loriculus regulus, bonapartei; Nestor esslingii, new species. (Same) *Myiopsitta tigrina* n. sp.—p. 144. (Verreaux) *Vidua hypocherina* n. sp., from the West coast of Africa; with a plate—p. 260-262. (Jaubert) Letters on the Ornithology of the South of France, concluded—p. 64-66, 97-105, 149-152, 262-267, 322-327, 403-417. (Dumeril) Note on the Reptiles of the Gabon; with two plates—p. 369-377, 417-424, 460-470. *New*, Chelonians, Pentonyx gabonensis, Cryptopodus aubryi; Scincoids, *Anelytrops*, n. g. for Acontias *elegans* Hallowell; *Anisoterma* n. g., A. sphenopsiforme n. sp.; Ophidians, Onychocephalus cæcus; *Holophurolis* n. g., H. olivaceus n. sp.; Elapomorphus gabonensis. ARTICULATA.—(Chevrolat) Six new Mexican Carabici—p. 351, 352. (Same) New European Longicornia—p. 435, 436. Callidium deltili, Dorcadion alpinum, Oberea mairii, pedemontana. (Same) New exotic Longicornia—p. 48, 84-89, 340-343, 436-438, 485-491, 531-535, 566-572. (Marseul) New Longicornia—p. 47. (Thomson) New species of Coleoptera of his collection; with four plates—p. 112-118, 472-483, 528-530. A new genus *Octocladiscus* is established for Cladophora flabellata of Dejean's Catalogue, the name Cladophorus having been applied by Guerin to a genus of Lycidæ. Mr. Thomson's ideas of the obligation under which the possessors of rich collections lie to publish the most interesting new species which they contain will scarcely meet the approbation of the modern critics who declaim so strongly against the publication of "detached species." At all events he has added to the value, such as it is, of the descriptions, by the elegant figures of so many of the new species. (Same) Four new species of Lucanidæ, with a list of the family after Hope, and a sketch of Lacordaire's general arrangement—p. 516-528. (Reiche) *Lucanus pentaphyllus* n. sp. of the South of France—p. 47, 80-82. (Same) *Onitis osiridis* n. sp. from Egypt, with a list of the species of this genus found in Europe and about the shores of the Mediterranean, Euxine, and Caspian seas—p. 118-121. (Fairmaire) New Coleoptera from Chili—p. 483-485; and Morocco—p. 530, 531. *Pyladus* n. g. of Scydmænidæ, &c. (Rojas) New Coleoptera of Venezuela—p. 565, 566. (Lucas) Further remarks on the immature characters of the individuals constituting the species *Eremiaphila barbara* Brisout—p. 42-47. (Robineau-Desvoidy) On the Scale insects, Coccidæ, of the Olive, Citron, Orange, and Oleander, and on the disease produced by them—p. 121-128, 180-188, 277-284, 387-393. (Guerin-M.) On the improved cocoons of silk obtained by MM. André-Jean and Bronski—p. 295-303. (Same) On the causes of the epidemic of the silkworm; an essay read before the Society of Acclimatisation—p. 583-589. MOLLUSCA.—(Bourguignat) Malacological Recreations; with thirteen plates—p. 7-21, 66-80, 226-247, 268-277, 327-340, 378-386, 424-435, 499-516. The author proposes a new genus

Zospeum for the species from the subterranean caverns of Carniola, &c., referred by German authors to the g. Carychium. Thirteen species are characterised. The other species of various families figured in the plates accompanying these papers of Bourguignat's, in the present volume, amount to fifty-five. (Marcel de Serres) On the marine origin of the Dreissenæ—p. 21-25. (Grimaud de Caux) On the animal of the Purpura of the ancients—p. 34-42. (Hupé, Montrouzier, Lorois) Descriptions of new shells—p. 47, 470-472. (Bonnafoux) Eggs of birds drilled by Helix hortensis—p. 446, 447. (Moquin-Tandon) Note on *Helix constricta* Boubée—p. 562-564, 592. RADIATA.—(Cailliaud) On the boring Echini of Brittany; with a plate—p. 158-179. PALEONTOLOGY.—(D'Orbigny) New species of Ammonites of the Jurassic and Cretaceous formations—p. 105-111. Twenty-seven new species described. PROCEEDINGS of the French Academy, for 1856: including, among others, notes of the following articles. Valenciennes: Eggs with multiple vitellus—p. 32. Texier: Large-tailed sheep of Caramania—p. 33. Marcel de Serres: the Touariks—p. 89. Millet: On re-stocking rivers with fish—p. 90. Bourguignon and Delafond: A form of scabies of the horse communicable to man—p. 91. Wanner: The Lungs the motive factor of the circulation of blood—p. 91. Bekker: The claw at the tip of the Lion's tail—p. 92. Caraguel: Influence of the weather on the construction of Spiders' webs—p. 130. Bonaparte: Perdix græca of Brisson a true species—p. 131. Schultze: Development of the Lamprey—p. 131. Bonaparte: Gray's Catalogue of Chelonians of British Museum—p. 132. Gervais: Materials for a Monograph of the Cheiroptera of S. America—p. 133-137. Hombres-Firmas: On Pecten glaber—p. 188. Pomel: Five new species of Rodentia from Algeria—p. 188-190. Raimondi: Origin of the Guano of the Chinchas islands—p. 190. Bonaparte: New species of Birds, Asiatic and American—p. 247-254. Same: Parallel tables of the order Gallinaceæ—p. 254. Marcel de Serres: Origin and formation of the Egg, and Primordial condition of Double monstrosity—p. 285. Valenciennes: Felis tulliana n. sp. of Asia Minor—p. 286. Schultze: Double monsters—p. 287. Guérin and Robert: Thermometer for the use of cultivators of silkworms—p. 288. Dufossé: Hermaphroditism in Serranus—p. 346. Marcel de Serres: The Male and Female egg of animals—p. 347. Guerin-M.: Coccus of the Bean, and its use as a dye stuff—p. 347-349. Richard: Multiplication of animals in France—p. 349. Pelouze: Liquid secreted by the abdominal gland of Carabus—p. 350. Davaine: Different degree of vitality in Vibrio tritici adult and larva—p. 351. Lartet: Dryopithecus fontani, a large fossil Ape of France—p. 394. Valenciennes: Filaria æthiopica n. sp. under the skin of the Hunting leopard—g. 395. Gaudry and Lartet: Paleontological discoveries in Attica—p. 396. Quatrefages: The Silkworm epidemic—p. 397. Bernard: Temperature of Animals—p. 399. Lespés: Natural History of Termes lucifugum—p. 439-442. Geoffroy St. Hilaire: Use of horse flesh as an article of food—p. 443. Chrestien: Efficacy of sulphur as a remedy for the grape disease merely mechanical—p. 492. Rossignon: The Blood river of Choluteca—p. 493. Bonaparte: Fossil Ornithology; the families Inepti and Struthiones—p. 494. Hollard: Systematic place of the Ostracionidæ—p. 496. Bonaparte: Gray's Catalogue of Columbæ of British Museum—p. 535. G. St. Hilaire: Introduction of Bombyx mylitta into France—p. 536-538. Paraney: Former existence of Epyornis on the continent of Africa as well as in Madagascar—p. 538. Guérin-M.: Agricultural Societies for France—p. 539-541. Jacquelin du Val: Law of structure of the Insect skeleton—p. 541. Ebrard: Muciparous loops of the Leech—p. 542. Greslot: Best form for beehives—p. 574. OBITUARY.—Barbié; Puton—p. 582, 583. REVIEWS.—Weiner: Figures of Animals kept for use or amusement—p. 289. Westwood: Butterflies of Great Britain—p. 290. Moquin-Tandon: Natural History of the land and freshwater shells of France, Vol. I.—p. 128-130. Grateloup and Raulin: Statistical and Geographical Tables of the land and fresh water Mollusca of France—p. 140-143. Grateloup: Geographical distribution of the Limacina—p. 143. Same: List of the land and freshwater Mollusca of France—p. 143. Liesville: List of the Mollusca of the country

about Alençon—p. 581. Drouet: Geographical distribution of the Mollusca of the Aube—p. 578. Fischer: Conchyliological Miscellanies—p. 579. Godron: Dreissena polymorpha naturalized in Lorraine—p. 580. Gassiez: Mollusca of Algeria in the Museum of the Linnean Society of Bordeaux—p. 582. Villa: On Helix frigida—p. 138. Same: On the genus Melania—p. 138. Strobel: The Gastropoda and Conchifera of the territory of Pavia—p. 577. Bulletin of the Moscow Society of Naturalists, Vol. XXVI., XXVII.—p. 94-96, 191. Proceedings of the Zoological Society of London, A.D. 1853, 1854—p. 291.

MEMOIRES DE LA SOCIETE IMPERIALE DES SCIENCES NATURELLES DE CHERBOURG. MEMOIRS OF THE CHERBOURG SOCIETY OF THE NATURAL SCIENCES. 8vo. Cherbourg et Paris. Vol. III. A.D. 1855.

MEMOIRS.—(Thuret) On *Bornetia*, a new genus of Algæ; with two plates—p. 155-160. (Nylander) Attempt at a new Classification of Lichenes; Part second—p. 161-202. (Le Jolis) Examination of the species confounded under the name *Laminaria digitata;* with observations on the genus Laminaria—p. 241-312. Published first in the Transactions of the Bonn Academy of Naturalists, Vol. XXV. SHORT COMMUNICATIONS.—(Beaulieu) On the Fishes of the Department of La Manche—p. 375. (Bertrand Lachenée) Plants observed in the neighbourhood of Cherbourg—p. 217-223, 387-389, 402. (Same) Monstrosity in the flowers of *Angelica sylvestris*—p. 236. (Lesdos) On some Silurian rocks in the North of the Department La Manche—p. 217. (Same and Besnou) Analysis of the Limonites of Sauxmesnil—p. 387.

ITALY.

ATTI DELL' I. R. ISTITUTO VENETO DI SCIENZE, ETC. TRANSACTIONS OF THE VENETIAN IMPERIAL INSTITUTE OF SCIENCES, LITERATURE, AND ARTS. Third Series. 8vo. Venezia. Vol. I. 1856.

(Molin) Anatomical and Physiological examination of the Heart and Circulatory system of the Boa constrictor; with twelve plates—p. 377-391, 429-470, 517-533. (Same) Reply to Nardo's note on the same—p. 798-809. (Nardo) On the works relating to the Heart and Circulation in Reptiles—p. 755-757, 809, 883-897. (Gera) On the contagious Atrophy of the Silk worms; New observations—p. 76-81. (Miniscalchi) On the *Sorgum saccharatum*—p. 216. (Fapanni) On the cultivation of flax in the Venetian territories, and on a method for getting rid of the troublesome weed *Silene linicola*—p. 361-377. (Catullo) Remarks on some late essays on Paleontology—p. 713-729. (Bizio) On the origin of the Diamond—p. 421-428.

MEMORIE DI MATEMATICA E DI FISICA DELLA SOCIETA ITALIANA DELLE SCIENZE IN MODENA. MEMOIRS OF THE SCIENTIFIC SOCIETY OF MODENA. Mathematical and Physical Sciences. Fo. Modena.

Vol. XXV. Part II. A.D. 1855.

(Bertoloni, A.) Plants of Liguria, second selection; with six plates—p. 121-127. The species figured are *Vinca acutiflora* Bert.; *Leucojum hyemale* Bert.; *Allium ampeloprasum* L.; *A. acutiflorum* Lois.; *A. oleraceum* L.; *A. ligusticum* Notaris. (Tenore) Notes on some species of *Cupressus;* with two plates—p. 187-195. Distinguishing under the trivial name *C. tournefortii* the "Cupressus lusitanica patula flore minori" of Tournefort, *C. lusitanica* Flore Portuguese, from the *C. glauca* Lamarck, which usually goes by that name. (Same) *Taxodium mucronatum* n. sp.; with two plates—p. 196-204.

ATTI DELL'ACCADEMIA PONTIFICIA DE' NUOVI LINCEI. TRANSACTIONS OF THE PONTIFICAL ACADEMY OF ROME. 4to. Roma.

Fifth year; Sessions of 1852. A.D. 1854.

(Sanguinetti) Prodomus of the Flora of Rome, containing the plants that grow spontaneously about Rome, in the Cisapennine Provinces of the Papal

States, and in the Picene Territory; continued. (Latini) On the Ammoniac given out in Respiration. (Volpicelli) Extract from Melloni's two Memoirs on the Magnetism of rocks.

Sixth year; Sessions of 1853. A.D. 1855.

(Ponzi) Geological map of the Comarca of Rome.

SPAIN.

MEMORIAS DE LA REAL ACADEMIA DE CIENCIAS DE MADRID. MEMOIRS OF THE MADRID ROYAL ACADEMY OF SCIENCE. Third Series. Natural Sciences. 4to. Madrid. Vol. I. A.D. 1850-1854.

Part I. A.D. 1850.

(Naceyro) List of the Birds observed in the environs of Santiago, and in other parts of the Province of Galicia—p. 93-116. (Grælls) Description of the Larva of *Agapanthia;* with a plate—p. 67-79. (Lujan) Geological studies of part of the Provinces of Badajos, Seville, Toledo, and Ciudad Real; with a map —p. 3-34. (Ezquerra del Bayo) Essay of a general account of the Geological —structure of the Spanish territory in the Peninsula; with a map--p. 35-65.

Part II. A.D. 1851.

(Vidal) List of the Birds of Albufera—p. 167-172. (Grælls) Description of some new species of Insects of Central Spain—p. 109-166. (Lujan) Geological studies, Part II.—p. 1-72. (Ezquerra) Geological description of Spain; Section II.—p. 73-108.

Part III. A.D. 1854.

(Ezquerra) Geological description of Spain; Section III.—p. 161-184. (Pastor y Lopez) Geognostical and Agricultural account of the Province of Asturias; Prize Essay of the Academy—p. 1-132.

AMERICA.

AMERICAN JOURNAL OF SCIENCE AND ARTS; Conducted by Professors Silliman and Dana, &c. 8vo. New York.

Vol. XXIII. January to May, 1857.

ORIGINAL ESSAYS.—(Nicklés) On the presence of Fluorine in the Blood—p. 101. (Gray) Statistics of the Flora of the Northern United States; continued from the preceding volume—p. 62-84, 369-403. Among the characteristics of this Flora, compared with that of Europe, the relative superiority in types of Orders is signalized, twenty-six Orders being included in it which are wanting to that of Europe; while that, exclusive of the Mediterranean basin, has only seven Orders which are not represented in this;—the prevalent subtropical character in those extra-European Orders;—the abundance of woody plants, and especially of trees, &c. (Hall) Observations on the Carboniferous Limestones of the Mississippi Valley—p. 187-203. (Same) On the genus *Archimedes* or *Fenestella* from the Carboniferous Limestones of the Mississippi Valley—p. 203, 204. (Bailey) Microscopic examination of the Soundings of the Atlantic, made in the voyage of the Arctic to and from Ireland, by Lieut. Berryman of the U. S. Navy—p. 153-157. The Coalfields of the East Indian Archipelago—p. 157-161. (Mallet) On the Rose-coloured Mica of Goshen, Massachusetts—p. 180. (Same) Analyses made for the Geological Survey of Alabama—p. 181-185. (Same) On "Red Sulphur"— p. 185-187. (Newberry) Mode of formation of Cannel Coal—p. 212-215. (Whitney) On the Huronian and Laurentian Systems of the Canada Geological Survey—p. 305-314. (Scrope) On the formation of Craters and the nature of the Liquidity of Lavas; Extracted from the Journal of the Geological Society of London—p. 346-359. (Genth) Contributions to Mineralogy—p. 415-427. (Pratt) On two Sulphurets of Copper, from the Canton Mine, Georgia, U. S.—p. 409-414. (Bakewell) On the Changes which have taken place, and which are now in progress, in the Falls of Niagara—p. 85-95. (LeConte) On the agency of the Gulf stream in the formation of the Peninsula and Keys of Florida—p. 46-60. (Bache) Observations on the cause of the increase of Sandy Hook—p. 16.

(Trask) On Earthquakes in California during 1856—p. 341-346. (Cobell) Biography of J. N. Von Fuchs; extracted from Proceedings of Bavarian Academy —p. 95-101, 225-233. LITERARY NOTICES.—Owen: On the Ruminants, and the Aboriginal cattle of Great Britain—p. 132-236. Hallowell: Appendix to papers on Reptiles in the Museum of Philadelphia Academy—p. 282-284. Agassiz: On some young Gar-pikes from Lake Ontario—p. 284. Fitch: Report on the Noxious and other Insects of New York—p. 150. Binney's Terrestrial Mollusks of the U. S.—p. 292. Leidy: On a boring Sponge, *Cliona*—p. 281. Heer: On the probable origin of the Organized beings now living in the Azores, Madeira, and the Canaries—p. 130-132. De Candolle: Prodromus Systematis Vegetabilium—p. 126. Bromfield: Flora Vectensis—p. 127. Seeman: Botany of the Voyage of the Herald—p. 127. Engelmann: Synopsis of the Cactaceæ of the United States, &c. —p. 128. Sullivant: The Musci and Hepaticæ of U. S. east of the Mississippi— p. 129. Henfrey: Origin of the Embryo in Plants—p. 278. Gray: First Lessons in Botany—p. 280-439. Mohl: On the causes of the opening and closing of Stomata—p. 280. Sullivant and Lesquereux: Musci Boreali-Americani exsiccati—p. 438. Ravenel: Fungi Caroliniani exsiccati—p. 439. Greg: Meteoric iron from Chili, containing Native Lead, &c.—p. 118. Higgins and Bickell: Composition of Columbian Guano—p. 121. Jackson: Analysis of Serpentine marbles, known as Verd Antique—p. 123-126. Shepard: Treatise on Mineralogy—p. 148. Ansted: Elementary Course of Geology, Mineralogy, &c.—p. 148. Blake: Occurrence of Telluret of Silver in California—p. 270. Leidy: Remains of extinct Animals discovered by Professor Emmons—p. 271. Owen: Geological Survey of Kentucky—p. 272. Jones: Shower of Ashes over the plains of Quito—p. 276. Coan: Volcanic action on Hawaii—p. 435. Lapham: Geological Survey of Wisconsin—p. 437. Carpenter: The Microscope and its Revelations—p. 149. OBITUARY.—W. C. Redfield—p. 292. Hugh Miller—p. 294. Jacob W. Bailey —p. 467. M. Tuomey—p. 668. CORRESPONDENCE of J. Nicklés—p 102-115, 440-447. NEW PUBLICATIONS—p. 151, 304, 450.

BRITISH INDIA.

JOURNAL OF THE ASIATIC SOCIETY OF BENGAL. New Series. 8vo. Calcutta. Vol. XXIV. for the year 1855. A.D. 1856.

ESSAYS.—(Piddington) On an unknown forest race (of Indian Veddahs?), inhabiting the Jungles South of Palmow—p. 207-210. (Blyth) Further remarks on the different species of Orang-utan—p. 518-528. (Same) On the Indian species of Shrews—p. 24-28. There are enumerated of Sorex 15 species, Feroculus 1, Soriculus 1, Crossopus 2; as *new species*—Sorex heterodon, melanodon, micronyx, nudipes, atratus. (Same) Report on a Zoological collection from the Somáli country—p. 291-306. (Hodgson) Catalogue of Nepalese Birds, collected between 1824 and 1844—p. 572-582. The list consists of 652 species; 89 Raptorial, 407 Passerine, 44 Gallinacean, 77 Wading, and 35 Natatorial Birds. (Tickell) Description of a new species of Hornbill from Tenasserim, *Buceros tickelli* Blyth—p. 285-287. (Theobald) Indian Oology; continued from Vol. XXIII.—p. 529-536. (Benson) Shells of Chusan, collected by Dr. T. Cantor—p. 119-140. *Incilaria* n. g., a connecting link between Arion and Onchidium; *Batillaria* n. g., for Cerithium zonale *Lam.*; *Laguncula* n. g., related both to Assiminia in the Turbinidæ, and to Lacuna and Globularia in the Naticidæ. (Hislop) On the age of the Coal strata in Western Bengal and Central India—p. 347-353. (Piddington) Report on two specimens of Cuttack coal—p. 240. (Same) Analysis of a Coal from Cherra Punji—p. 283. (Same) On the Kunkurs of Burdwan, as a flux for smelting Iron ores—p. 212-214. (Marcadieu) Report on the Kooloo Iron mines, and a portion of the Mannikura Valley—p. 191-202. (Royle) On the Graphite of Kumaon and Travancore—p. 203-206. PROCEEDINGS.—The species of Orang-utan of Borneo and Sumatra—p. 469. Squirrels of Burmah—p. 472-477. Animals of Pegu; *Lepus peguensis*, and many new species of Birds—p. 471-481. New Mammalia, Reptilia, and Amphibia, from Pegu—p. 711-721. *Sorex fuliginosus* Blyth, n. sp., from Pegu—p. 362. Comparative view of the Birds of India and

Eastern Africa—p. 252-265. Birds of Tenasserim; many new species—p. 266-281. *Hesperiphona affinis* Blyth, n. sp., from the Punjaub—p. 179. Note on *Grus antigone* and *G. australasica*—p. 360. Subdivision of the genus *Malacocercus* Swainson—p. 478. *Dipsas hexagonotus*, Blyth, n. sp.—p. 360. Phosphorescent marine animals—p. 541.

BRITAIN.

THE TRANSACTIONS OF THE LINNÆAN SOCIETY OF LONDON. 4to. London. Vol. XXII. Part I.; with nineteen Plates. 1856.

(Hooker, J. D.) On the Structure and Affinities of Balanophoreæ; with sixteen plates—p. 1-68. (Henfrey, A.) On the development of the ovule of *Santalum album*; with some Remarks on the phænomena of Impregnation of Plants generally; with two plates—p. 69-79. (Miers, J.) Remarks on the nature of the outer fleshy covering of the Seed in the Clusiaceæ, Magnoliaceæ, &c., and on the development of the Raphe in general, under its various circumstances; with figures—p. 81-95. (Same) On several instances of the Anomalous development of the Raphe in seeds, and the probable Causes of such deviations from the usual course of structure, especially in reference to *Stemonurus*, *Urandra* of Thwaites, with some prefatory remarks on that genus; with figures—p. 97-112.

The present volume commences with an elaborate paper by Dr. Hooker on the structure and affinities of the BALANOPHOREÆ, a group of root-parasites of very curious structure and strange aspect, combining in some degree the external characters of Fungi with the floral apparatus of phanerogamous plants. Only one of these plants is a native of Europe, and was known to the older writers by the name of "*Fungus melitensis*," under which appellation it long enjoyed a reputation as a styptic; all the rest are natives of tropical or subtropical countries. The majority inhabit the mountain forests of India and S. America, where they sometimes ascend to 10,000 feet. A few are scattered over the Eastern Archipelago, and in the Pacific Islands, and two occur at the Cape of Good Hope. Some have remarkably wide ranges for parasitic plants, the European species (*Cynomorium coccineum*) extending "from the Canary Islands to the mouths of the Nile, through 3,000 miles of longitude," and some others are as widely dispersed; most, however, are, so far as known, very local. In Dr. Hooker's memoir twenty-eight species are enumerated, and these are arranged under fourteen genera—a proof of the highly diversified structure which occurs in the Order—and which is further illustrated by a distribution into two sub-orders and seven tribes. Indeed, Dr. Hooker seems to think that future discoveries may induce botanists to break up the Order into several. The largest genus is *Balanophora*, of which eight species are enumerated. Only two other genera, *Lophophytum* and *Corynæa*, have more than two species, and eight genera are founded on solitary species; yet we do not think the generic subdivision has been carried to excess. The characters assigned seem plain and well chosen, and diversities in the rhizome and inflorescence, which indicate difference of habit, are employed as accessory to those derived from the styles, stamens, and perianth. Botanists have long debated and differed on the true position which the Balanophoreæ ought to occupy in a lineal distribution of the Natural Orders. By some these parasites have been supposed acotyledonous, and associated with Fungi. Lindley devised his class Rhizogens, which he places below Endogens, for this and two other Orders of root-parasites which agree in the nature of their parasitism and in little else. Endlicher favours the same view, though he does not consider his "*Rhizantheæ*" as more than a minor class—a term which he employs as the equivalent of Lindley's "Alliance." Other and perhaps most botanists have regarded them as an anomalous form of Endogens, differing from the ordinary types in having an imperfectly developed embryo, and scaly fungoid habit. We believe that the late Mr. Griffith was the first to suggest a dicotyledonous affinity for the order, which he placed in the neighbourhood of Urticeæ, with the exception of *Mystropetalum*, referred by him to Lorantheæ. Dr. Hooker, in the present memoir, brings forward evidence of the exogenous structure of the rhizomes, and consequently infers dicotyledonous embryo, although of a very imperfect type

—that is to say, of a homogenous structure, destitute of cotyledons. It appears to be developed in an ovule deprived of the usual integuments, or reduced to a simple nucleus, and is lodged in albumen of firm texture. Embryonic seeds have, however, as yet been observed in but three out of the fourteen genera known. With respect to the exact affinities of Balanophoreæ, Dr. Hooker says:—"In endeavouring to determine the affinities of Balanophoreæ, I shall disregard the negative characters—as those may be termed which are founded on the imperfection of organs—and I shall take the most perfectly developed species as the best expositors of the typical structure of the order. In so doing, I believe I am obeying a maxim supported by an extensive study of the natural system; for there are few natural orders, however perfect, that do not present structurally incomplete genera and species, many of which, in point of development of their organs, might rank below many Balanophoreæ and some Cryptogams, but which, nevertheless, are not departures from the type of the order, but simply less developed forms of it. Balanophoreæ have an adherent perianth in all the genera where this organ is developed, and an epigynous stamen in Cynomorium, the only species in which hermaphrodite flowers occur. These characters indicate a position amongst the epigynous Calycifloræ, a group which, though far from being well limited as a natural class, is in our present state of knowledge one of considerable value as comprehending many nearly allied natural families. Amongst them the most direct relation of Balanophoreæ is certainly with Haloragеæ (and especially Gunnera), with which it presents many important characters in common, especially the valvate perianth and stamens opposite its lobes, and near which I would place it in a lineal series." He then proceeds to detail, at some length, the various points of agreement with Haloragеæ, an Order made up, like the Balanophoreæ, of genera in various stages of organic development, and itself an imperfect expression of a higher type of structure. No botanist who has hitherto investigated this Order has had command of such ample materials as Dr. Hooker, and very few, indeed, of living botanists could have made such excellent use of them. The details of structure are given with this author's usual exactness, and at the same time with brevity; and the paper is illustrated by sixteen quarto plates full of admirably executed figures. In preparing these plates no pains have been spared to render them a full atlas of the matter contained in the body of the memoir.

Journal of the Proceedings of the Linnean Society. Published quarterly. 8vo. Longman and Co., and Williams and Norgate, London. Vol. I. No. IV. March, 1857.

Zoology.—(Walker) Catalogue of the Homopterous Insects collected at Sarawak, Borneo, by Mr. A. R. Wallace, with descriptions of New species; with two plates—p. 141-175. Another rich contribution to the Natural History of the Indian Archipelago, from the same source which has already opened the Entomological fauna of Malacca and the islands of the Straits to our knowledge. One hundred and forty-five new species are described, while only thirty-nine of the whole number collected have been previously characterized, and of these not more than one-third by other authors. Seventeen new genera are proposed, nearly all of which are illustrated with figures. These are—of Dictyophorides 3, Leusaba, Isporisa, Epora; Cixioides 4, Bidis, Ostama, Erana, Rhotala; Issites 1, Hiracia; Flatoides 7, Benna, Serida, Paricana, Nicerta, Eucarpia, Rhotana, Ficarasa; Aphrophorides 1, Amarusa; Scarides 1, Isaca. Most of these new generic names have an unclassical twang; but we are not well enough acquainted with the Eastern tongues to tell whether the author has borrowed from the Malayan or the Dyak; according to the precedent set by Amyot, who, having exhausted, it may be presumed, the vein of Pelasgic roots, betook himself for new combinations to the Sanskrit and Chinese, supplied him at second hand. Index, Contents, &c.—pp. 12.

Botany.—(Oliver) Note respecting Glandular appendages of the leaves in the autumnal rosettes of Epilobium montanum—p. 190. (Bennett) Description of the Kobo tree, *Guibourtia copallifera*, a new genus of Leguminosæ, col-

lected by Dr. W. F. Daniell in Sierra Leone—p. 149-151. (Archer, T. C.) Extract from a letter of his to Mr. Bell, on the gum of the Kobo tree—p. 151. (Masters) Note on a Monstrosity of the flowers of *Saponaria officinalis*—p. 159-162. (Lindley) Note on *Spiranthes gemmipara*—p. 168-170. Babington has referred this to S. cernua, but it is here recognised again as a distinct species, which is confined to a very limited district in Ireland. (Same) Contributions to the Orchidology of India, No. I.—p. 170-190. Of the learned author's particular qualifications for the task it is needless to say anything. Concerning his materials it is here stated that "there is little that has not been entrusted to me, except the Malay plants of Horsfield in this country, and those of Blume from Java and other Dutch islands." One of the most remarkable results of the comparison of the various collections, placed at the author's disposal, has been to dissipate the common notion that the species of Orchideæ generally have a very limited range. This may probably be true of the Epiphytes, but certainly is not so as to the terrestrial kinds. Of seventy-one species illustrated in this present part, twenty-two are new. A new Analytical table is appended of the genera of the Physurid Neottieæ, from which the genera *Plesaure*, *Ulantha*, and *Galera* are here excluded, and other corrections are introduced of the author's general work on the Orchideæ. (Seemann) On the Palm of Timbuctoo—p. 152-157. Here determined as *Borassus æthiopum*. (Berkeley) Note on the use of the Rhizoma of *Pteris aquilina* as an article of food—p. 156. (Same) On the recent discoveries in relation to the Microgonidia of Fresh-water Algæ —p. 145-147. (Hicks) *Draparnaldia cruciata*, a new species—p. 192. (Currey) On *Peziza curreyana* Berkeley, n. sp., being the perfect development of Sclerotium roseum *Kneiff*—p. 147-149. (Same) On a species of Pilobolus, P. roridus? new to Britain; with a plate—p. 162-167. (Berkeley) On some Entomogenous Sphaeriæ; with a plate—p. 157-159. Five new species of *Cordyceps* are described, all from South Carolina, U. S. This brings the total number known of Entomogenous species of the genus up to nineteen. Of these Europe possesses four, two of them in common with America, and one with Africa. Index—pp. 11.

QUARTERLY JOURNAL OF THE GEOLOGICAL SOCIETY. 8vo. London.
Vol. XII. A.D. 1856.

(Poole, H.) Visit to Asia Minor in search of coal; Abstract—p. 1-4. (Godwin-Austen, R.) On the Newer Tertiaries of Suffolk; Abstract—p. 4-6. (Prestwich, J.) On the Boring at Kentish Town—p. 6-14. (Murchison, R. I.) On the uppermost Silurian Rocks at Lesmahago—p. 15-25. (Salter, J. W., and Huxley, T. H.) On some new Crustaceans from the uppermost Silurian Rocks—p. 26-37. *Himantopterus* n. g., allied to Eurypterus, six species, new. Perfect forms of the genus *Ceratiocaris* M'Coy, figured. (Godwin-Austen) On the possible extension of the Coal measures beneath the S. E. of England; with a map—p. 38-73. (Banks, R. W.) On the Tile stones of Kingston, and their contents; with a plate—p. 93-101. (Sharpe, D.) On the last Elevation of the Alps—p. 102-123. (Owen, R.) Fossil Cranium of the Musk Buffalo from the Gravel at Maidenhead—p. 124-130. (Prestwich, J.) On the Gravel at Maidenhead in which this cranium was found—p. 131-133. (Martin, P. J.) Geological Features of the country between the South Downs and the Sussex coast—p. 134-137. (Sorby, H. C.) Physical Geography of the Tertiary Estuary of the Isle of Wight; Abstract—p. 137. (Binney, E. W.) On the Permian character of some of the Red Sandstones and Breccias of the South of Scotland—p. 138-140. (Tayler, J. W.) On the Cryolite of Evigtok, Greenland—p. 140-144. (Ansted, D. T.) On the Copperlode of Cobre, Cuba—p. 144-153. (Bedford, J.) On the Raised Beaches of the Western Isles—p. 167-169. (Moggridge, M.) On a Section exposed in the Excavation of the Swansea Docks—p. 169-171. (Miller, T.) On the late Eruption of Mauna Loa—p. 171-386. (Haughton, S.) On the Granites of Ireland—p. 171-202. (Poole, H.) Visit to the Red Sea—p. 203. (Owen, R.) On *Gastornis Parisiensis*; with a plate—p. 204-217. (Same) Mammalian remains from the Red

Crag—p. 217-236. (Rubidge, R. N.) Geology of Southern Africa—p. 237. (Harkness, R.) Lowest Sedimentary Rocks of the South of Scotland—p. 238-245. (Salter, J. W.) Fossils from the Rocks of the Longmynd; with a plate—p. 246-251. (Degousée and Laurent) On the Valenciennes Coalfield; with a plate—p. 252-254. (Harkness, R.) On the age of the Sandstones and Breccias of the South of Scotland—p. 254-267. (Wilson, Jas. S.) Notes on the Geology of the neighbourhood of Sydney, Newcastle, and Brisbane, Australia; Abstract—p. 283-288. (Beckles, S. H.) On the lowest strata of the Cliffs at Hastings—p. 288-292. (Wright, T.) On the Palæontological and Stratigraphical relations of the "Sands of the Inferior Oolite"—p. 292-325. (Boué, A.) On the probable origin of the English Channel by means of a fissure; Abstract—p. 325. (Scrope, G. P.) On the formation of Craters and the nature of the Liquidity of Lavas—p. 326-350. (Binney, E. W.) On some Footmarks in the Millstone Grit of Tintwistle, Cheshire—p. 350-354. (Croker, J. G.) On the Lignite deposits of Bovey Tracey, Devonshire; Abstract—p. 354. (Bunbury, C. J. F.) Notice of some appearances observed on Draining a Mere near Wretham Hall, Norfolk—p. 355, 356. (Dick, A.) Analysis of the Cleveland Iron ore from Eston—p. 357. (Cobbold, R. H.) On the occurrence of Coal near the city of E-u in China—p. 358. (Moore, J. C.) On the Silurian rocks of Wigtownshire—p. 359-366. (Babbage, C.) On the action of Ocean currents on the formation of the strata of the Earth; Abstract—p. 366-368. (Plant, Jas.) On the Upper Keuper Sandstone included in the New Red Marls, and its Fossils, at Leicester—p. 369-373. (Brodie, P. B.) On the Upper Keuper Sandstone of Warwickshire—p. 374-377. (Woodward, S. P.) On an *Orthoceras* from China; with a plate—p. 378-381. (Salter, J. W.) On a new genus of Cephalopoda, *Diploceras*, *Orthoceras bisiphonatum* of Sowerby, and on the occurrence of *Ascoceras* in Britain; Abstract—p. 381. (Symonds, W. S.) On Trap-dykes intersecting Syenite in the Malvern Hills, Worcestershire—p. 382. (Sawkins, J. G.) On the movement of land in the South Sea Islands—p. 383. (Ibbetson, L. L. B.) On the possible origin of Veins of Gold in Quartz and other Rocks; Abstract—p. 384. (Charters, S.) On a Section near Mont Blanc—p. 385. (Spratt) On the Geology of Varna and its Vicinity, and of other parts of Bulgaria; Abstract—p. 387, 388. (Bowen, H. G.) On the Geology of Trinadad; Abstract—p. 389. (Salter, J. W.) On the Fossils found in the Chalk flints and Greensand of Aberdeenshire; Abstract—p. 390. (Prestwich, J.) Correlation of the Middle Eocene Tertiaries of England, France, and Belgium; Abstract—p. 390-392.

Translations and Notices of Geological Memoirs.—Lipold: Geology of N. E. Carynthia—p. 1. Muenichdorfer and Lipold: Iron ores of the Huettenberg—p. 2. Breithaupt: On the Mineral vein at Guadalajara—p. 4. Jokèly: Gneiss and Granite of Central Bohemia—p. 5. Patera: Silver ores of Joachimsthal—p. 6. Rolle: Lignite of Kainach, Styria—p. 7. Von Hauer: Quicksilver deposits near Cividale, Venetian Lombardy—p. 8. Nœggerath: Late Earthquake in Switzerland—p. 9. Johnstonite from Transylvania—p. 10. Heckel: Fossil fishes of Austria—p. 12. Hochstetter: Geology of Carlsbad—p. 12-14. Kenngott: Piauzite from Styria—p. 14. Barrande: Silurian Fossils from Wossek, Bohemia—p. 15. Von Hauer: Method of preparing Lithion—p. 11. (Same) Mode of procuring Alumina—p. 15. Hingerau: Lignites of the Hausruck—p. 16. Kleszczynsky: Silver and Lead from Bohemia—p. 17. Vallach: Metalliferous vein in the Erzgebirge—p. 18. Hochstetter: Thermal springs of Carlsbad—p. 18. Bensch: On Basalt—p. 19. Kenngott: Junkerite—p. 20. Same: Remarkable Crystals of Quartz and Fluor spar—p. 20. Renevier: Lower Greensand and Blackdown Fossils of England—p. 21. Oppel: *Acanthoteuthis* and *Aptychus*—p. 22. Kudernatsch: Geology of the Bannat—p. 25. Reuss: Metalliferous veins of Pribram, Bohemia—p. 26. Hœrnes: Gastropoda of the Alpine Trias—p. 26. Catullo: Upper Sedimentary deposits of the Venetian territory; Fossil Bryozoa, Anthozoa, and Sponges, contained in them—p. 26-28. Hœrnes: Post-tertiary shells from the coast of Greece—p. 28. Report of General Annual Meeting, and Anniversary Address of the President, W. J. Hamilton, Esq. —pp. 119.

TRANSACTIONS OF THE ENTOMOLOGICAL SOCIETY OF LONDON. New Series. Vol. IV. Part III.; with three plates. Price 3s. 8vo. London. 1857.

(Newman) Characters of a few apparently undescribed Insects, collected by James Gibson, Esq., at Moreton Bay, N. Australia—p. 51-57. (Saunders, W. W.) Transformations of Natal Lepidoptera; with three plates—p. 58. The plates, from drawings by Mr. R. W. Plant, contain coloured figures of the Larva and Pupa, or the Cocoon, of *Papilio polycenes*, *Attacus mythimna*, *Anthona arata*, and some other species undetermined. *Egybolia vaillantina* Boisd., and *Lebeda cuneilinea* Walker, n. sp., are also illustrated, in all stages. (Westwood) Notes on the Wing veins of Insects—p. 60-64. A critique of Mr. Newman's article noticed, p. 61, Notices of Serials, in Volume III. of this Review. (Wollaston) A Revision of the British Atomariæ; with observations on the genus—p. 64-82. A masterly contribution to the classification of the native Coleoptera, based on a critical examination of the original specimens in the collections of Marsham and Stephens, along with the materials contributed by other Entomologists living, making a sum total of no less than 1,224 British specimens of the genus which have passed under Mr. Wollaston's eye, besides eighty-seven Continental types with which his own cabinet is supplied. He has found the genus merge into *Ephistemus* so decidedly, that the most important structural difference he could detect is the presence of a minute tooth inside the apex of the mandible in *Atomaria*. The number of British species admitted is twenty-three, of which only one, *A. hislopi*, is treated as new, and the somewhat entangled synonymy of the others, which were found previously described, is carefully unravelled. Proceedings, from July 7th to October 6th, 1856—pp. 16.

THE ANNALS AND MAGAZINE OF NATURAL HISTORY; including Zoology, Botany, and Geology. No. 112, April; No. 113, May; No. 114, June, 1857. 8vo., with Plates. Price 2s. 6d. each. London: Taylor and Francis.

No. 112, April. (W. R. Parker and T. Rupert Jones) Description of some Foraminifera from the coast of Norway; with two plates. (Richard Howse, South Shields) Notes on the Permian System of the Counties of Durham and Northumberland. (Andrew Murray) List of Coleoptera received from Old Calabar, on the west coast of Africa; with a plate. (W. H. Benson) New species of Bulimus from India, Burmah, and the Mauritius. (A. Chatin) On the anatomy of Rhinanthaceæ, considered in its relations with the classification of these plants. Proceedings of the Zoological Society and Botanical Society of Edinburgh. Miscellaneous. —(J. K. E. Fairholme) Observations on the Pteropus of Australia. (M. Leprieur) On the Metamorphosis of Trachys pygmæa. (J. E. Gray) On a monstrosity of Haliotis (albicans?). (W. King) Perforated Structure of Rynchonella geinitziana. (J. E. Gray) On the Nucleus of the Operculum of Cyclostoma elegans. (Ernst Brucke) Object slides of Canary glass. (John Gould) On two new species of Humming Birds, belonging to the genus Amazilius.

No. 113, May.—(J. Koren and D. C. Danielssen) Researches on the Development of the Pectinibranchiata; with two plates. (J. E. Gray) A revision of the Genera of some of the Families of Conchifera or Bivalve Shells; Part III. Arcadæ. (Arthur Adams, F.L.S.) On a new species of the genus Macgillivrayia. (John Nietner, Colombo, Ceylon) Description of New Ceylon Coleoptera. (C. Lespes) Note on a Nematoid Worm, parasitic upon Termites. (John Denis Macdonald, Assis. Sur. R.N.) Brief Description of a Ctenostomatous Polyzoon, allied to Vesicularia, occurring on the Australian Coast, and also an Anatomical Description of a species of Asteroid Polypes, probably forming the type of a new genus of Alcyonidæ. Bibliographical Notices. Proceedings of Royal Society. Zoological Society. At one of the meetings of this Society Mr. S. P. Woodward exhibited some Land and Freshwater Shells, collected by Dr. Thompson on the lofty plains of Kashmir and Thibet—the number of species is about 32, one-half of them, strange to relate, being common British forms. If, therefore, these small sand shells originally migrated into our country from the East, we must ascribe to their occupancy of the lofty

plains of Kashmir and Thibet a very high antiquity compared with any of the monuments which Man himself has reared, even in the country most usually regarded as the cradle of his race. Botanical Society of Edinburgh. Geological Society. Miscellaneous. (E. Blanchard) Observations on the generation of the Arachnida. (E. Faivre) On the Brain of the Dytici, in its relations to Locomotion. (M. Sars) On Spiochætopterus, a new genus of Annelides from the Coast of Norway. (J. D. Macdonald) On the Sea Sawdust of the Pacific. Obituary Notice of Dr. Ball.

No. 114, June.—(J. Koren and D. C. Danielssen) Researches on the Development of the Pectinibranchata. (Andrew Murray) List of Coleoptera received from Old Calabar, on the West of Africa. (Arthur Adams, Surgeon, R.N.) Description of two new species of Heteropodous Mollusca. (Richard Howse, South Shields) Notes on the Permian System of the Counties of Durham and Northumberland. (J. Alder) Notes on Sepia biserialis and S. elegans. (A. Schenten) On some Mites and their young states; with a plate. Bibliographical Notices. Proceedings of Zoological Society. Miscellaneous.—(Dr. C. Semper) Note on the Anatomy of Physiology of the Pulmoniferous Mollusca. (G. Lindström) Notes on the Invertebrate Fauna of the Baltic Sea. (M. Fairholme) The Blacks of Moreton Bay and the Porpoises. (I. Jno. Moser) Eolis Landburgii. Title Page and Index to Vol. XIX.

THE ZOOLOGIST. Nos. 174, 175, March; No. 176, April; No. 177, May; No. 178, June, 1857. 8vo. London: John Van Voorst. Price 1s. each number.

Nos. 174 and 175, March.—PROCEEDINGS OF SOCIETIES.—Entomological Society. RADIATA.—(E. W. H. Holdsworth) Note on Serpula contortuplicata, and on a species of Othonia. ORIGINAL ESSAYS.—(Rev. J. C. Atkinson) Reason and Instinct: Part the First. (R. Knox, M.D., F.R.S.E.) Zoology; its present Phasis and future Prospects. The present phasis of Zoology—so we learn from this article—is industrial, and on this Dr. Knox proceeds to break the first vials of his wrath. In his eyes, it would appear, Economic Geology is vexation, and Economic Botany as bad; but it is the practical application of Zoology in particular which makes him mad. "Of impure origin, and suited only to the muddy banks of the Thames," he exclaims in an ecstasy of jubilant scorn; again, to cap a climax, we are certified that "sound Zoological science never existed here" in Britain. [While disposing thus summarily of all our scientific pretenders, from the days of Ray down to Owen, it is clear, however, that one great Anatomist is meant to be excepted—one whose authority is quoted continually in the course of this article—be-asterisked in foot notes, and be-obelisked "Knox," or "Myself."] This sad defect of the Anglo-Saxon race ("the human Gorilla—of model England and model America") he has no difficulty in accounting for—"a hypocrisy which has been called 'organized,' but which must mean 'organic,' has no doubt something to do with it." Cato the Elder, as we read, concluded every oration with "Delenda est Carthago." Voltaire was fond of winding up his letters to his satellites of the Encyclopédie with "Ecrasez l'infame." Doctor Knox, censor and satirist in one, whatever the subject in hand may be, is pretty sure to bolt aside for the sake of fetching a backhanded stroke at *his* bête noire—Theology, Natural and Revealed. "The most slavish of doctrines, the theory of final causes"—"the compilation ascribed to Moses"—"the parti prêtre, haters of truth and genius—as they must of necessity ever be." Such are a few of the polished shafts that he launches against the doctrine of Creative design, the integrity of Holy Writ, the belief of Christianity, when he has taken his stand, as here, behind Zoology for a stalking-horse. And if he could succeed in getting rid of every relation of science to the glory of God, as well as to the use of man, what, may we ask, does Dr. Knox intend to retain as the object of it? To treat the pursuit of knowledge as a handmaid merely to man's physical wants and sensual gratifications is, indeed, both to fetter and degrade it; and if Dr. Knox had been content fairly to expose that tendency wherever he found it, we could have more than borne with him; but one who makes of science a mere exercise of mental power, or gratification of curiosity, is surely no better than an intellectual volup-

tuary, and has fallen into a sort of spiritual idolatry, less gross, it may be, but hardly less pernicious to man's higher capacities, than is the simple slavery of the animal appetites; this partaking more of the brute, but that of the demon. We cannot consider the present essay, in spite of its catching title, as by any means a happy sample of Dr. Knox's characteristic style, "toads and diamonds" dropping promiscuously:—along with some sparkling bits, the spotted progeny predominate here so nakedly. Let him write, indeed, as perversely or as carelessly as he will, this is to be said for him, he is not often vapid; the quality of the meat may not be undeniable, but it is pretty sure to be seasoned with some salt sufficiently pungent, if not exactly Attic. For the readers of the 'Zoologist,' however, he seems, on this occasion, to have dished up the veriest sweepings of his study. If the wit be not superabundant and somewhat heavy; to make up for this, the reasoning is light enough and flimsy in texture. Logic has been likened, somewhere, to the closed fist—Rhetoric to the open hand; the logic Dr. Knox employs would not altogether justify the comparison. If he has managed to exemplify in a very small compass all the tritest fallacies that writers on Logic have taken pains to distinguish and name; at least they glare out here as "patent fallacies." We had marked for extract a few particularly fine specimens, from Dr. Knox, of the more common forms of false reasoning —"Begging the question"—"Irrelevant conclusion"—"Equivocal middle term," &c., &c.—when we lighted on a sentence so inimitably characteristic in its sapient incoherency, that we have put all the rest aside to make room for this one. Reader, attend; it is the clew to almost the sole properly Zoological inquiry in the whole of these thirty pages. Dr. Knox loquitur, more Socratico—Is SPECIES ALWAYS YOUNG, OR IS IT GENUS? What felicity of expression here! what profundity of thought! It is, possibly, as hard to see to the bottom of a puddle as of the ocean; but it is not because they are both equally deep. A fool, it has been proverbially said, may ask questions that a wise man is not able to answer. To do Dr. Knox justice, he has *not* answered the question he has here put—in either capacity. That oracular deliverance, however, he makes the key-note to a pretty smart dissertation on his favourite theme, Specific transmutation. It seems almost unaccountable that Dr. Knox, a clever practical Anatomist, should so totally misapprehend and misrepresent the results of Embryological discoveries, as to repeat here the intrepid assertion, that "The young of all the species of the same genus possess at first all the specific characters of the different species of the genus." Had it been stated that at a certain period of embryonic life, in every species, no characters are apparent but what are in common to all the species of the same genus at a more advanced stage of existence, the proposition would be intelligible, and might be susceptible of proof or disproof by comparative observations. As it stands, the sentence is simply absurd, affirming an impossibility. The characters of each species necessarily negative those of every other, in one or more particulars; and contradictories predicated of the same subject cannot both be true. We are not going to discuss the theory of Specific transmutation here; we doubt, indeed, if the materialists who countenance this would accept of Dr. Knox for their champion, or confess themselves vanquished in his defeat. What the venerable author of the "Discourse on the Studies of the University of Cambridge" objected to the theory of "Gradual development," broached long ago by Lamarck—when this was attempted to be resuscitated here in the subtle and shallow "Vestiges of Creation"—continues to apply equally to that later modification of it, which Dr. Knox has derived from other Continental sources. Neither the ascertained facts of living nature, nor the results of geological discoveries furnish a proof, or probability in its favour. It is mere gratuitous theory, which cannot even lay claim to the title of a scientific hypothesis. *This* is often useful, in order to give its direction to observation or experiment, as an attempt, by anticipation, to account for a set of observed facts as yet insufficient to sustain a complete induction. The Development theory has to fabricate both its facts and fancies, for ever revolving in a vicious circle. We ask for proofs, and are to rest satisfied, forsooth, with being told that the

evidence, which does not exist, will be discovered hereafter. Disputants of this calibre must be satisfied to have their bold assertions discounted, in the conditional mood and the paulo-post-futurum tense. We have treated Dr. Knox's lucubrations, up to this point, seriously; we must now confess a misgiving that has flashed across us sometimes, considering the jeering tone that runs through even his most dogmatical utterances. We have had to ask ourselves more than once—is this jest or earnest?—can Dr. Knox be *quite* serious in anything—unless it be in personal pique and jealousy, and in his grave offences against propriety, good taste, and candour? For the sober discussion of a philosophical question there is far too constant a straining after irony;—if, on the other hand, it is meant for jest, it must be set down as something of the longest and the dullest. We were not surprised to learn, from the cover of the April number, that this insertion has been the occasion of inflicting upon the Editor a voluminous correspondence, conveying to him, without exception, disapproval of the tone and tenor of Dr. Knox's article. Neither shall we be surprised if his readers are not disposed to concede the complete exemption from responsibility, which the Editor insists upon, for having lent to such a composition—only not insidious in its tendency, because of its being so broadly offensive in tone—the extended circulation which the Zoologist enjoys, and so deservedly in general, hitherto. To this unlucky protegé it was not merely the latchkey that the good-natured Editor granted, but a particular introduction. His subscribers were duly prepared to read Dr. Knox's Zoology with great interest—which the Editor himself had not read when he penned this recommendation. We can make allowance—*haud ignari mali*—for human weakness, for editorial weariness. *We* have, indeed, read those thirty pages through—it was our duty, and they were before us fair in type; but we can conceive that a proportionally bulky, cramped, manuscript may have offered a much more deterrent aspect to other aching eyes, amid the urgency of craving compositors and the cries for "copy," while the relentless month, hurrying to its close, was to be prevented with a sturdy punctuality. The Editor trusted to Doctor Knox's judgment in confining himself to the subject of his paper as implied in the title. We admire the confiding simplicity—which we could scarcely have the courage to imitate. It is a good while ago, that one whose untimely flight from earth science and friendship have not yet ceased to deplore, Edward Forbes (and his kind heart so tempered the keenness of his intellect, that he could scarcely apply the rod, however merited, without some healing unction), wrote concerning Dr. Knox, "We are afraid the Doctor is too hardened a scribe ever to change the manner and matter of his discourses;" and we are not aware that he has shown any more signs of grace since. But if the Editor did trust too fondly, and was betrayed, he has taken the earliest opportunity to remedy the inadvertence, at least to neutralize that recommendation by an equivalent upon the cover of the following number, where he has repudiated, in the most unreserved and unequivocal manner, both the views themselves, advocated in the pages of the Zoologist by Dr. Knox, and the spirit in which they are discussed. We have waited in hopes, yet further, to see some similar note of dissent from him in a position as permanent and conspicuous as that essay itself will occupy in the completed volume. It is so far well;—it will be better still that no possible room should be left for an unjust suspicion that the Editor withholds his sympathy from the politics and the polemics which Dr. Knox has obtruded here—only on the wrapper of the Zoologist. QUADRUPEDS.—(S. C. Tress Beale) Sagacity of the Rat. BIRDS.—(Lieut. Blakeston, R.A.) Birds of the Crimea. (Capt. Hadfield) Notes on a Female Brambling. (Rev. H. Harpur Crewe) Occurrence of the Hooded Crow in Derbyshire; Note on the Robin and Butcher Bird. (E. Hearle Rodd) Occurrence of the Fire-crested Regulus near Penzance. (C. Tress Beale) Note on the Common Wren. (Samuel Carten) Abundance of Wagtails. (Henry Smurthwaite) Notes on the Great Bustard; Rare British Birds in Germany. (C. W. Shepherd) Occurrence of the Avocet and Rose-coloured Pastor near Rochester. PROCEEDINGS OF SOCIETIES.—Entomological Society, January 5, 1857.

No. 176, April. PROCEEDINGS OF SOCIETIES.—Entomological Society. Northern Entomological Society. FISHES.—(R. Q. Couch) Notes of a Shark taken near the Land's End; and of a Thrasher Shark taken in Mount's Bay. MOLLUSCA.—(W. Webster) Skenea tricarinata not a species. (Rev. A. M. Norman) Schoolboys' amusement in Southey's Days. CRUSTACEA.—(R. Q. Couch) Remarks on Polybius Henslowii. INSECTS.—(Rev. J. Greene) Appeal to British Entomologists. (C. R. Bree) Honesty and Dishonesty; British List of Lepidoptera. (John Scott) Lepidoptera and their Parasites. (Rev. G. Gordon) Pupa hunting. (R. S. Edleston) Pupa digging round Manchester. (H. W. Browne) Correction of an error in the *Intelligencer*. (A. Russell) Butterflies attracted by sugar. (Rev. A. M. Norman) Caterpillar of Phalaena escula; use of the Anal fork of the Puss Moth. (Richard Weaver) Note on the Economy of Psyche opacella; cases of a supposed new Psyche, found on rocks near Conway. Entomological excursion from Birmingham to Sutherlandshire. (George Wailes) Nomenclature of Noctuina. (Rev. H. Harpur Crewe) Pupa of Agriopis aprilina; Pupa Raking. (A. Wallace) Larva of Laphygma exigua. (Bracy Clark) Supposed new Œstrus. According to Mr. Clarke here, judging from the description, nothing more than a variety of his Œstrus veterinus, *i. e.*, *Gastrus nasalis* Mg. (T. J. Bold) Nomada Ochrostoma in north of England; copulation of Bombi; capture and description of Epuræa neglecta. (Edward Parfitt) New Hymenopterous Insect; occurrence of Latridius filiformis. (F. Plant) Captures of Coleoptera in Leicestershire. (Arthur Adams and Dr. W. B. Baikie) Systematic List of the Coleoptera found in the vicinity of Alverstoke, South Hants. RADIATA.—(William Thompson) Rosy feather-star in Weymouth Bay. (Rev. A. M. Norman) Enquiry respecting the preservation of the Echinidæ. Natural History collectors in foreign countries, H. W. Bates and A. R. Wallace, Esq.

No. 177. May.—Letter from the Rev. Hamlet Clark, from Rio Janeiro. (Rev. J. C. Atkinson) Reason and Instinct. QUADRUPEDS.—(J. H. Jenkinson) Notes on British Bats. (Rev. J. Farr) Singing Mouse. (Rev. J. C. Atkinson) Anecdote of a Dog. (E. H. Rodd) Occurrence of the Harvest Mouse in Cornwall. BIRDS.—(C. R. Bree) Note on Parus major. (John Gatcombe) Occurrence of the Tree Sparrow in Devonshire. (Henry Smurthwaite) Note on the Black Redstart. (Edward Hearle Rodd) Occurrence of the Blackcap Warbler, throughout the Winter Months, near Penzance. (Henry Smurthwaite) Change of Plumage in Motacilla alba. (John Gatcombe) Occurrence of Rare Birds near Plymouth in 1856. (Osbert Salvin) Note on the Sabine's Snipe killed in Norfolk. (John Joseph Briggs) Occurrence of the Bittern in Derbyshire. (Lord Clermont) Mute Swans in Dundalk Bay. (John Joseph Briggs) Occurrence of the Pink-footed Goose in Derbyshire. (William Thompson) Occurrence of the Long-tailed Duck at Weymouth. (Edward Hearle Rodd) Occurrence of the Bridled or Ringed Guillemot near Penzance; Note on the British Skuas, genus Lestris. (Lieut. Thomas Blakiston) Birds of the Crimea.

No. 178. June.—BIRDS.—(Captain Charles W. Watkins) Birds of Andalusia. FISHES.—(William Thompson) Occurrence of the Butterfly Blenny in Weymouth Bay. (Edmund Thomas Higgins) The Blackbellied Flounder. (R. H. Meade) Occurrence of the Little Gurnard on the Coast of Lancashire. (Cuthbert Collingwood) The Carp at Charlottenburg. MOLLUSKS.—(Rev. Alfred Merle Norman) Notes on the Oxfordshire Shells. (William F. Templer) Observations on the Mollusca to be found on the Coast of Cornwall. CRUSTACEA.—(Jonathan Couch, F.L.S.) Notes on the Habits of the Nipper Crab. (John Robert Kinahan, M.B.) Description of a new British Species of Shrimp. ARACHNIDA.—(R. H. Meade) Sketch of a short Arachnological Excursion; List of new and rare British Arachnidans. (Captain John M. Jones) Note on the Centipede. INSECTS.—(Henry Doubleday) On introducing Foreign Specimens into British Collections. (H. Cooke) The new Noctua. Captures of Lepidoptera recorded in the "Intelligencer." (Rev. P. H. Newnham) Hyponomeuta vigintipunctatus bred. (Edward Newman) Narycia elegans a Lepidopterous Insect. This announce-

ment on the authority of Dr. Hagen, who has examined Stephens' original specimens in the British Museum. *Acentropus niveus*, too, falls under the same sentence—a conclusion at which, Mr. Newman tells us, he himself had arrived previously. We have no doubt he is correct in that opinion; but when he goes on to say that "the propriety of this last-named change had previously been guessed at, but no sufficient arguments adduced in its support," we are obliged to demur, remembering the reasons assigned by Kolenati. nearly ten years ago, for referring this insect to the family Pyralidæ. (C. R. Bree, and Edward Parfitt) Corrections of previous Errors. (Bracy Clark) Further Note on the supposed new Œstrus. It is truly delightful to see the venerable author—Mr. Clark is in his eighty-seventh year—ready to enter the lists again, in which he won his maiden spurs, with more than youthful ardour. We are glad to have confirmed, by such unquestionable authority, the opinion we had ventured previously to give on the species, from the published description. On some other points, touching its relationship and origin, we see no reason to vary from the few brief remarks we have already made—see the number of this Review for last April, p. 59, except by adding that Kellner has proved that *O. trompe* engenders maggots of the frontal sinus in the *Red-deer* also; *O. pictus* in this and the Fallow-deer. That *Oestrus trompe* should be the male of *O. tarandi*, as has been suggested, seems more than improbable. The characters of the two are distinct enough, and the economy different. Besides, both male and female of each is known and described, the sexual differences being apparent, either in the comparative breadth of the front, or the characteristic structure of the posterior segments. (Edward Newman) New Helophilus. (T. J. Bold) Capture of a Fossorial Hymenopterous Insect, new to Britain. (Edward Newman) Rare British Coleoptera. (G. R. Waterhouse) List of the British species of Aleocharidæ. A really valuable contribution to the synonymy of the Coleoptera of Europe, and the critical study of the native Fauna. The list will be especially, but not exclusively, interesting to British entomologists. We have little doubt that the preparation of the materials for these five pages has cost the conscientious author as much pains, at least, as many another writer has expended on the composition of some pretentious essay extending over as many sheets perhaps. Mr. Waterhouse promises to give hereafter some remarks on the species enumerated; we shall look for these with impatience. We miss from the list one genus, Diglossa, which we do not know that it has ever been proposed before to exclude from this family. (T. V. Wollaston) Note on the Dromius glabratus of British Cabinets. After a very careful examination of the Stephensian Cabinet, Mr. Wollaston has found that there are two species of Dromius confounded under the name glabratus—namely, the D. glabratus and D. maurus. The former species is easily known from the latter, not only by its uniformly larger size, but by its elytra being proportionately less abbreviated; their striæ more apparent; by its prothorax being rather more quadrate; and by its head and antennæ being larger and more robust. PROCEEDINGS OF SOCIETIES.—Entomological, Zoological, and Society of Northern Entomologists. (Cap. V. H. W. Hadfield) Reason and Instinct.

EDINBURGH NEW PHILOSOPHICAL JOURNAL; exhibiting a View of the Progressive Discoveries and Improvements in the Sciences and Arts. Edited by Thomas Anderson, M.D.; Sir W. Jardine, Bart.; J. H. Balfour, M.D.; and, for America, H. D. Rogers, F.G.S., &c. No. 10. April, 1857: published quarterly, 8vo. Price 6s.; with four Plates and a Map. Edinburgh: A. and C. Black.

No. 10. April.—(Lorin Blodget) Distribution of Heat in the North American Climate, with a map. (Andrew Murray) Description of new Coleoptera from the Western Andes and the neighbourhood of Quito; with a plate. (H. F. Baxter) On the Influence of Magnetism over Chemical action. (Sir W. Jardine, Bart.) Contributions to Ornithology, No. IV. (Rev. W. S. Symonds) Correlation of the Triassic Rocks in the Vale of Worcester and at the Malvern Tunnel. (Rev. P. B. Brodie, A.M.) On some species of Corals in the Lias of Gloucestershire, Worcestershire, Warwickshire, and Scotland. (William Crowder) Chemistry of the Iron

Manufacture of the Cleveland District. (H. C. Sorby) The Physical Geography of the Tertiary Estuary of the Isle of Wight. (T. Strethill Wright, M.D.) On Hydractinia echinata; with two plates. (Thomas Stevenson) Description of a self-registering maximum and minimum arrangement for the Syphon Barometer. (Professor J. Forbes) Notice respecting Father Secchi's Statical Barometer and on the Origin of the Cathetometer. (Professor Goodsir) On the reproductive economy of Bees; being an account of the Results of Von Siebold's recent researches in Parthenogenesis. Reviews. Correspondence. Proceedings of Societies. The American Association. Scientific Intelligence. We perceive that the next volume of the Smithsonian Institute Publications is likely to be Dr. Brewer's great work on American Oology. The first part to include the rapacious Birds, and, perhaps, the Swallows—there will be five quarto plates to this part, all the figures taken in Photograph from the original Eggs, and printed in colours—the result being extremely beautiful and accurate. Index and Title page to Vol. V., New Series.

The Phytologist. A Botanical Journal. Published Monthly. 8vo. London: W. Pamplin. New Series. No. 24, April; No. 25, May; No. 26, June, 1857. Price 1s. each.

No. 24, April.—(John Windsor, F.L.S.) On the Hieracia of Settle. (Isaac Carroll) Notices of scarce Irish Plants. (J. G. Baker) Maritime and Inland Temperatures; or the contrast between the summer temperature of an inland and a maritime locality. General summary, or results of a Tour in Scotland. (Robert C. Douglass) Pyrus domestica. Notices of Books. Botanical Notes. Notices and Queries.

No. 25, May.—(Rev. W. M. Hind) Dingle and its Flora. (Rev. H. A. Stowell) Notes on the Rarer Faversham Plants. (J. G. Baker) Notes and Description of new British Lichens. (John H. Davies) Mosses occurring on the Isle of Man. Notices of New Books. (Professor Lindley) On Spiranthes gemmipara. Feejee Islands and their vegetation. Botanical Notes. Notices and Queries.

No. 26, June.—(H. J. Church) Diatomaceæ, their characteristics and structure; together with remarks on collecting and examining this order of plants, being condensed from Rabenhorst's work on the Fresh-water Diatomaceæ. Note on the root of the Cicuta virosa. On Progress. (George Jordan) Economical Botany. Note on Calamintha Nepeta. (Rev. T. F. Ravenshaw) Botanical notes from Wells, Somersetshire. Reviews. Botanical Notes. Notices and Queries. Among these we find a notice of the exhibition of Fungi in cases. The Fungi referred to, which are exhibited in one of the rooms of the Royal Institute, Liverpool, were collected by the Rev. H. H. Higgins, and are arranged on stained deal boards, about 4 inches by 6. The specimens were dried without pressure, and retain in most cases their natural form and colour. They are all indigenous to Liverpool and its immediate environs. We never saw a more interesting collection. It reflects the greatest credit on the respected botanist, to whose unwearied industry it owes its formation. We would suggest that such Fungi as are useful, or good for food, should be marked as such, and those known to be decidedly poisonous might be conspicuously placed. If the flavours of the various mushrooms (which could be found in Badham's amusing work) were also affixed, it might offer still greater attractions to our English Fungi eaters. Each number of the Phytologist contains 8 pp. of Descriptive British Botany.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 99, April; No. 100, May; No. 101, June, 1857. 8vo. London: Lovell Reeve. Each number with one Plate. Price 2s.

No. 99, April.—The Exhibition at Paris, 1855.—(Keuter, C. E.) Forest Economy, particularly as regards the Austrian department. Excursion into the Interior of Navite Levue, the principal of the Feejee Islands, being extracts of a Letter from Mr. Milne, Botanist to H.M.S. Herald; dated Fejee, Oct. 7, 1856.

Botanical Information.—(H. G. R. Robinson, Governor, West Indies) Notes on the Vegetation of the Island of St. Kitt's. (Burke) Fibre cleaning machine. Scientific.—Exploring Expeditions of the British Government. We have here the details of the Expedition under Dr. W. B. Baikie up the Niger (Kwora) and Tsadda (Benue), of the Survey of Vancouver's Island, and the adjacent coasts of British North America, by Capt. Richards, and of an Exploring Journey into British North America, by J. Palliser, Esq. All the expeditions are accompanied by Botanists or by Medical men whose knowledge of Natural History will in these unexplored regions be found most important. Notices of new Books.

No. 100, May.—Notice of the Botanic Garden at Peradenia, Ceylon; with a List of Natural Families and Genera of Phænogamic Plants and Ferns, showing the number of species indigenous to Ceylon which each genus contains, and which are in the Herbarium, or drawings of them in the Library of the Gardens. The number of species is 2,916. (Dr. Berthold Seeman) On the Properties and Uses of the Crescentiaceæ. Ascent of Chimborazo, by M. Jules Reiny, a Frenchman, and by Mr. Brenckley, an Englishman. According to the account of these gentlemen, they found themselves, after many weary hours spent in ascending, compelled to descend this far-famed mountain, owing to the raging of a furious Equatorial storm; but before doing so, they, by means of thermometers, took observations as to the height they had reached. For some time previous it had been almost dark; but they became sensible that the elevation had become less steep, and they were even able to walk with facility. On reaching Guaranda they calculated from their observations that they had reached the height, 21,466 feet, which is the elevation assigned to Chimborazo by Humboldt. Humboldt, accompanied by Bonpland, had reached as high as 19,357, in 1802, and Boussingault, in 1831, as high as 19,700. Botanical information. Letter from James Motley from Borneo, and from Rev. G. Nicol, from Sierra Leone. Notices of new Books.

No. 101, June.—(James Tate Johnson) Notes on some rare, new, little known Plants inhabiting Madeira. (Dr. F. Mueller, Colonial Botanist of Melbourne, and Botanist to the Expedition) Notes made during the recent Expedition across the Northern portion of Australia, under the command of Mr. Surveyor Gregory. (Sir W. J. Hooker, F.L.S.) On the Palmite of South Africa. (J. D. Hooker, M.D.) On Notaspartium, a new genus of Leguminosæ from New Zealand. (Captain E. W. Ward, R.E.) Report on the New Zealand Woods. New Zealand Flax. £4000 reward for rendering the Flax and other fibrous plants of the country available as articles of export. Botanical Information.—Accomplishment of the overland journey across North Australia from Victoria River (N. W. Australia) to Brisbane on the East coast, &c. Notices of Books.

Quarterly Journal of Microscopical Science. No. 18, January, 1857. Price 4s. With Woodcuts and Lithographic Illustrations. 8vo. London: John Churchill.

Original Communications.—(W. Lauder Lindsay, M.D.) Monograph of the genus Abrothallus. We hope to notice this monograph in the Review portion of our next number. (Rev. J. B. P. Dennis) Existence of Birds during the deposition of the Stonesfield Slate, proved by a comparison of the Microscopic Structure of certain Bones of that formation with that of recent bones. (Thomas H. Huxley, F.R.S.) On Dysteria, a new genus of Infusoria. (Professor J. W. Bailey) Origin of Greensand and its formation in the Oceans of the Present Epoch. (Hon. and Rev. S. G. Osborne) Further observations on Vegetable growth. (Dr. Woodham Webb) On striated muscular fibres in the skin of the Human Lip. Translations. (A. Braun) New and little known genera of Unicellular Algæ, preceded by observations respecting Unicellular Algæ in general. (Dr. H. Cienkowski) Remarks on Dr. Stein's doctrine respecting Acineta forms. Notes and Correspondence and Proceedings of the Microscopical Society.

BRITAIN.

The Annals and Magazine of Natural History; including Zoology, Botany, and Geology. No. 115, July; No. 116, August; No. 117, September, 1857. With Plates. London: Taylor and Francis.

No. 115, July.—(Dr. Max Schultze) Contributions to the knowledge of the Terrestrial Planariæ from communications from Dr. Fritz Mueller, of Brazil, and personal investigations. (Dr. F. Mueller) Description of a new species of Earth-worm. (W. B. Carpenter, M.D., F.R.S., F.L.S.) Remarks on MM. Koren and Danielssen's Researches on the development of Purpura Lapillus. (H. J. Carter) On the ultimate Structure of Spongilla, and additional Notes on Freshwater Infusoria; with a plate. (Arthur Adams, F.L.S.) Notice of the animal of Turbo Sarmaticus and other mollusca from the Cape. (R. M. Andrew, F.R.S., and L. Barrett, F.G.S.) List of the Echinodermata dredged between Droutheim and the North Cape. (L. Barrett) Descriptions of four new species of Echinodermata; with a plate. Bibliographical Notices. Proceedings of Learned Societies. Miscellaneous. (Professor Troschel) On the Saliva of Dolium galea. (C. W. Peach) On the occurrence of the Harvest mouse in Cornwall. (Dr. Schmidt) Notice of the Baradla Cavern, near Agtelk in Hungary. (M. Fairholme) On the Australian Dugong.

No. 116, August.—(Professor Japetus Steenstrup) Hectocotylus formation in Argonauta and Tremoctopus, explained by observations on similar formations in the Cephalopoda in general. (E. J. Chapman) On the occurrence of the genus Cryptoceras in Silurian Rocks. (Andrew Murray) List of Coleoptera received from Old Calabar, on the West Coast of Africa. (T. Anderson, M.D.) Notes on the Indian species of Lycium. (William B. Carpenter, M.D., F.R.S.) On the development of Purpura Lapillus. (Dr. P. De Filippi) Observations on the Larvæ of Trematode Worms. (J. Koren and D. C. Danielssen) Observations on the development of the Star Fishes. Bibliographical Notices. Proceedings of Learned Societies. Miscellaneous. (Hugo Von Mohl) On the causes of the opening and closing of Stomates. (M. Sars) Description of new Norwegian Annelides. (C. C. Babington) On Gladiolus imbricatus. (George Norman) Notes on some new and rare Diatomaceæ from the stomachs of Ascidiæ. (Professor Langer) On the Vascular System of Anodonta.

No. 117, September.—(Hugo Von Mohl) Researches on the mode in which Gum-Tragacanth is formed. (John Lycett) On the sands intermediate the Inferior Oolite and the Lias of the Cotteswold Hills, compared with a similar deposit upon the coast of Yorkshire. (John Nietner, Colombo, Ceylon) Descriptions of new Ceylon Coleoptera. (Rev. P. B. Brodie) Remarks on the Lias of Barrow, in Leicestershire, compared with the lower part of that formation in Gloucestershire, Worcestershire, and Warwickshire. (John Denis Macdonald, H. M. S. Herald) Observations on the Microscopic examination of Foraminifera obtained in deep sea bottoms at the Feejee Islands; with a plate. (E. Claparède) On the development of Neritina fluviatilis. (Professor Karl Gegenbaur) Observations on Trachelius ovum. (Dr. L. Radlkofer) On true Partheno-gensis in Plants. Proceedings of Learned Societies. Miscellaneous. (M. T. De Lacaze Duthiers) On the nervous system of Dentalium entalis. (M. Sars) Description of some new Norwegian Polypes. (J. D. Macdonald, H. M. S. Herald) On the Natural History of the Conway Rat. (D. C. Danielssen and J. Koren) Description of Sephoractinia, a new genus of Actiniæ from Norway. (Dr. E. Moore) On the occurrence of Uroceras Gigas in Cornwall.

Edinburgh New Philosophical Journal; exhibiting a View of the Progressive Discoveries and Improvements in the Sciences and Arts. Edited by Thomas Anderson, M.D.; Sir W. Jardine, Bart.; and T. H. Balfour, M.D; and for America, W. Rodgers. Vol. VI. No. 1. July, 1857: to be continued quarterly. 8vo. Price 6s.; with Four Plates.

No. 1, July.—(Dr. H. C. Lombard) Mountain Climates considered in a Medical point of view. (W. Baird, M.D., F.L.S.) Notes on the Food of some fresh-

water Fishes, more particularly the Vendace and Trout. (H. T. Baxter) On the influence of Magnetism on Chemical action. (Thomas S. Traill, M.D.) On the occultation of Rivers. (Charles Richardson, M.D.) Chronological remarks on the River Wye. (Henry How, Professor of Chemistry and Natural History, King's College, Windsor, Novia Scotia) On the occurrence of Natro-boro-calcite with Glauber Salts in the Gypsum of Nova Scotia. (W. L. Green, of Honolulu, Sandwich Islands) On the cause of the Pyramidal form of the outlines of the southern extremities of the great Continents and Peninsulas of the globe. (T. Strethill Wright, M.D.) Observations on British Zoophytes; with two plates. These observations are most valuable; and we have seldom perused a scientific paper with more pleasure and profit than this one of Dr. Strethill Wright. It abounds with original research, and is the result of unbiassed thought, and of a mind fresh from the field of nature. (Thomas Strethill Wright, M.D.) On the prehensile apparatus of Spio seticornis. (Louis Blodget, U. S.) The distribution of Rain in the temperate latitudes of North America. (Augustus A. Hayes, Assayer to the State of Massachusetts, U. S. A.) On the composition of the Phosphate of Lime existing in sea-water; and on the composition of the so-called Guanos of the Atlantic Islands. (David Forbes, F G.S.) On the Chemical composition of some Norwegian Minerals. Part III. (Andrew Murray, Edinburgh) On Insect Vision and Blind Insects. Reviews. Proceedings of the Royal Society of Edinburgh; the Royal Physical Society of Edinburgh; and the Botanical Society of Edinburgh. Literary Information.

THE QUARTERLY JOURNAL OF MICROSCOPICAL SCIENCE. No. 20, July. 8vo. London: J. Churchill. Price 4s.

No. 20, July.—*Transactions of the Microscopical Society of London*—(W. Hislop) Description of an Object-compressor for preparing and mounting objects. (John Grove, M.R.C.S.) On a Fungus parasitic in the Human Ear. (Arthur Fane, M.D., F.R.S.) Description of an early Human Embryo of about the fourth week of utero-gestation. *Journal of Microscopical Science.*—ORIGINAL COMMUNICATIONS.—(W. Lauder Lindsay, M.D.) On the structure of Lecidea lugubris. (Thomas Brightwell, F.L.S.) On Self-division in Noctiluca. (Rev. J. B. P. Dennis) On the microscopical characters of certain so-called Cetacean Bones associated with Cetolites in the Detrital Bed of the Red Crag at Felixston, Suffolk. (Arthur M. Edwards) On "Finders" for microscopes. TRANSLATIONS.—(N. Lieberkuhn) Contributions to the History of the Development of the Spongillæ. (Professor Max Schultze) Abstract of "Observations on the Reproduction of the Rhizopoda." Reviews. Notes and Correspondence. Proceedings of Societies. Zoophytology. Index and Title-page to Vol. V.

THE ZOOLOGIST. No. 179, July; No. 180, August; and No. 181, September. 8vo. London: John Van Voorst. Price 1s. each.

No. 179. July.—(Rev. Hamlet Clark, Mr. A. R. Wallace, Mr. H. W. Bates) Proceedings of Natural History Collectors in Foreign Countries. QUADRUPEDS. —(J. J. Reading) Dr. Leach and the Elephant. (J. Pristo) Beautiful Variety of the Mole. (Cuthbert Collingwood, M.D.) Singular Familiarity of a Squirrel. (J. H. Jenkinson) Capture of Vespertilio Nattereri. (Captain H. W. Hadfield) Reddish gray Bat. (Charles William Peach) Harvest Mouse: Anecdote of a Dog. (Jonathan Couch, F.L.S.) On the Connexion of Reason with Instinct. BIRDS.—(The Marquis Oratio Antinori) On the Migration and Breeding of Pastor roseus in the neighbourhood of Smyrna. (Lieutenant T. Blakiston, R.A.) Birds of the Crimea. (H. Stevenson) Occurrence of Tengmalm's Owl in Norfolk. (G. E. Bulger) Occurrence of the Lesser Spotted Woodpecker near Fermoy. (Reginald Bosworth Smith) Raven Pairing with Crow; Hawfinch Breeding at Marlborough. (Captain H. W. Hadfield) Note on the Reed Bunting; Notes on the Rook; Early Arrival of the Cuckoo, &c.; Another Egg Prodigy; Notes on the House Sparrow; Notes on the European Nuthatch; Note on the

Woodchat Shrike; Note on the Grasshopper Warbler; Note on the Nightingale; Parus major.

No. 180. August.—(Rev. S. H. Newenham) Remarks on the Etymology of Names of Animals. (Robert Warrington) On the Aquarium. MOLLUSKS.—(Rev. A. Merle Norman) The Mollusca of the Firth of Clyde. CRUSTACEA.—(J. R. Kinahan) List of the Podophthalmous Crustacea occurring in Dublin Bay. (George Guyon) Note on Carcinas mænas. INSECTS.—(James Cooper) Hybernating larvæ Feeding on Moss. (Jas. Gardner) Capture of the Deilephila Euphorbiæ near Box Hill. (Richard Weaver, F. Bonney, and Edward S. Bonney) Localities for Gastropacha Ilicifolia. (J. J. Reading) Silkworms feeding on the Oak in China; Captures at Street Lamps; Cucullia Chamomillæ; Ennomos illustraria. (R. F. Logan) Eupithecia cognata and E. subfulvata bred from the same batch of Eggs. (C. B. Newman) Capture of Abraxas Ulmaria at West Wickham. (R. S. Edleston) Varieties of Abraxas Ulmaria, &c.; Notes on Tineina. (Bracy Clark) The Tzetze of Africa identified with Œstrus Bovis. (E. Parfitt) Description of the Male of Megastigmus Pinus. (C. S. Gregson) Capture of Dyschirius impunctipennis. (J. Gatcombe) Carabus intricatus near Plymouth. (T. Vernon Wollaston) Description of an uncharacterized British Anthicus. (J. Hardy) Chrysomela cerealis. (George Guyon) The Aquarium. Proceedings of Zoological Society. (H. W. Bates) Notes on an Excursion from Ega to Tunantins and Fonte Boa, on the Upper Amazons.

No. 181. September.—(Henry Walter Bates) Notes on an Excursion from Ega to Tunantins and Fonte Boa, on the Upper Amazons. (Rev. Ed. Tagart, F.L.S.) Remarks on the Necessity of precise Definitions in Attempts to Distinguish Reason and Instinct. BIRDS.—(Captain Henry W. Hadfield) Notes and Remarks on a few of the Birds of Southern India. (Thomas Edward) Occurrence of the Kite near Banff. (H. Stevenson) Hawfinches breeding in Suffolk; Inquiry respecting the Plumage of the Common Dipper. (Captain Henry W. Hadfield) Note on the Migration of the Swallow Tribe; Nidification of the House Sparrow. (John Woolley, jun.) Nidification of the Bohemian Waxwing. (W. H. Slaney) Swallows. (William Thompson) Hurstpierpoint; a great Curiosity. The Shoveller breeding in Dorsetshire. (H. Stevenson) Note on the Little Auk appearing on the Norfolk Coast in Summer. FISHES.—(George Guyon) The Eye of the Carp turns on its Axis. MOLLUSKS.—(Rev. Alfred Merle Norman) Giant Specimens of Unio tumidus and U. pictorum. CRUSTACEA.—(John Robert Kinahan) Description of a Galathea new to Science. INSECTS.—(James Gardner) Capture of Trochilium Allantiforme at Hungerford. (Charles E. Challis) Abraxis Ulmaria at Coombe Wood. (G. R. Waterhouse) Corrections to Mr. Waterhouse's List of Aleocharidæ. PROCEEDINGS OF SOCIETIES.—Zoological Society; Entomological Society.

THE PHYTOLOGIST. A BOTANICAL JOURNAL. Published Monthly. 8vo. London: W. Pamplin. With Plates. New Series. No. 27, July; No. 28, August; No. 29, September. Price 1s. each.

No. 27. July.—(John Barton). Observations on the Character of the Snowdonian Flora, and on the Geographical Relations of Anemone pulsatilla and Astragalus hypoglottis. (Zoilos) Remarks on Botanical Glossaries and Nomenclature. (Rev. H. A. Stowell) Faversham Plants. (Rev. R. H. Webb) Supplement to the Flora Hertfordiensis. (J. Backhouse) Remarks on British Hieracia. Botanical Notes. Notices and Queries. Answers to Communications received.

No. 28. August.—(J. G. Baker) Observations on Thalictrum minus and its Allies, which inhabit Great Britain. (M. H. Wilkin) Botanical Sketches. (J. G. Baker) Geological Relations of Plants—List of Plants found on Forrest Hill. (W. Mitten) Notes on some New or Rare British Mosses. (Rev. H. A. Stowell) Faversham Plants. Notices of the Natural History Review and of Moore Index Filicum. Botanical Notes. Notices and Queries. Notices to Correspondents.

No. 29. September.—(W. T. Bree, O. W. Borrer, and W. H. Lucas) On Gladiolus communis. (William Marshall) The American Water-weed (anacharis alsinastrum). (E. Edwards) Additions to the Flora Hertfordiensis. (I. W.)

Botanical Sketches, Yarmouth. (Rev. T. F. Ravenshaw) List of Plants found in the West Highlands. (C. Barter) Niger Expedition, Letter from the Botanist of. (D. Moore, A.L.S.) Notes on Salix procumbens and other Plants not previously noticed as Irish Species. (A. G. More, F.L.S.) Anemone pulsatilla, &c. Plants supposed to have disappeared from England. Notices of Stark's Manual of the Aquarium and of Lawson's Microscopical Preparations. Botanical Notes. Notices and Queries.

Hooker's Journal of Botany, and Kew Garden Miscellany. No. 102, July; No. 103, August; No. 104, September.

No. 102, July.—(Dr. Mueller) Notes made during the recent Expedition across the northern portion of Australia. (Dr. J. D. Hooker) On Bryocarpum, a new genus of Himalayan Primulaceæ; and on Loxodiscus, a new genus of Sapindaceæ. (J. C. Gregory) Journal of the North Australian Expedition. (C. F. D. Parkinson) The Bunya-Bunya and Water Lilies of North-eastern Australia. (Professor Braun) Characeæ Australes. (B. Clarke) On Pteris aquilina as an Esculent vegetable. British North-American Exploring Expedition. Notice of Rev. M. J. Berkeley's Introduction to Cryptogamic Botany; and of Bentham's Plantæ Hartwegianæ.

No. 103, August.—(Dr. Mueller) Notes made during the recent Expedition across the Northern portion of Australia. (J. C. Gregory) Letter on the North Australian Exploring. (Dr. J. D. Hooker) On three new Indian Scrophularineæ. (N. A. Dalzell) Observations on the Cissus quadrangularis of Linneus. (Dr. Baikie) Second Exploring Expedition up the Kwora. (Charles Wilson) Destruction of Gutta Percha trees in Singapore. (N. H. Masson) Musschia Wollastoni, and selection of woods from the Island of Madeira. Notice of the Canadian Naturalist and Geologist.

No. 104, September.—(Dr. W. B. Baikie) Notice of his second Exploring Voyage up the Kwora. (C. Wilhelmi) Notes on some Edible and Useful Australian Plants. (Sir W. J. Hooker) On Asplenium nigripes, a Mexican, and on Davallia nodosa, an Indian Fern. (Dr. Harvey) Flora of South Africa. (C. Wilford) Botanical Mission to the Chinese Seas. (Dr. Grisebach) Flora of the British West Indian Islands. Finland Bread. On the cultivation of Guinea-grass in Malta. Results of the Trade in Palm Oil and Ground-nuts on the West Coast of Africa. Notices of Exposition des Genres de la famille des Polypodiacées, and Memoires sur la Famille des Fougères, by A. L. A. Fée. A Catalogue of the Ferns in the Royal Gardens of Kew, and on cultivated Ferns, by John Smith. Of Index Filicum, by T. Moore. Of Filices Horti Botanici Lipsiensis, and Veber einigil Farngatterngen, by Dr. G. Mettenius. Of Plantæ Caribeæ, by A. Grisebach. Of Xenia Orchidacea, by Reichenbach; and of Illustrazioni delle Piante nuove e rare dell' orto Botanio di Padova.

The Naturalist: a popular monthly Magazine, with numerous Engravings; conducted by B. R. Morris, Esq., M.D. No. 71, January; No. 72, February; No. 73, March, 1857. 8vo. Price 6d. each. London: Messrs. Groombridge.

No. 72. February.—(T. Fuller) The Study of Natural History conducive to Health. (George R. Twinn) Addenda to Bird-retreating. (T. Fuller) Birds using Oil from Glands, for the purpose of lubricating the surface of their plumage. On Unity of System. (W.) A Peep at the Ferns, &c., of Sutherland and Ross. Miscellaneous Notices.—Gray Phalarope; Ringtail Harrier; Merlin; Little Auk; Little Grebe; Scarcity of Birds in hard weather; the Knot; Landrail; Skylarks; Starling and Blue Tit. Reviews.—A Simple Catechism of the Animal, Vegetable, and Mineral Kingdoms. By Charlotte O'Brien. The Natural History Review. Exchange.—Algæ; British Eggs. Proceedings of Societies.—Thirsk Natural History Society. The Querist.—The Chimney Swallow; Vegetable Caterpillar from New Zealand; Substance used to represent Snow and Ice; the Heratical Subject. Obituary.—Death of Mr. David Dyson.

No. 73. March.—(T. Fuller) The Study of Natural History conducive to Health. (O. S. Round) Sympathy between Man and Animals. (F. M. Burton) On the Classification of the Animal Kingdom by the Distribution of the Nerves. (J. McIntosh) Injurious Insects—No. VII. On Unity of System. (G. R. Twinn) Notes from Norfolk. (The Editor) Systema Naturæ. (Robert Marris) A list of some of the most uncommon species of Lepidoptera in the neighbourhood of Wisbeach, Cambridgeshire. MISCELLANEOUS NOTICES.—Beggarwoman's Dog; the Common Tern; the Kittiwake Gull; the Nightingale; Extraordinary flights of Larks; Rara avis; a curious incident in Entomology; Winter work; Weather wisdom; English Snakes; Filling and emptying an aquarium. REVIEW.—The Natural History Review.

No. 74, April. (O. S. Round) Swallows. On the Unity of System. (J. S. Walker) Three days in the Falkland Islands. (W.) A Peep at the Ferns of Sutherland and Ross. (T. G. Bonney) List of Butterflies and Sphinges observed at Lausanne, Switzerland. Entomological captures in 1856. (G. Stockley) Notice of the Diurnal Lepidoptera in my neighbourhood. (W.) Contributions to an Entomology of Banffshire.—Butterflies. (The Editor) Systema Naturæ. Miscellaneous Notices.—Wild Cat. Great Black Woodpecker. The Crested Grebe. Attachment of the Nightingale to young of its own species. Notices in Zoology. Hybernating Papilionidæ, &c. Review.—Blunders in Behaviour. Querist.—The Nettle-bird and the Gorse-bird.

No. 75, May. (O. S. Round) Swallows. (F. M. Burton) On the Classification of the Animal Kingdom. No. 2. (T. Fuller) On the Destruction of Birds. (Lieutenant Blakiston, R.A., and Lieutenant Bland, R.E.) A List of the Birds of Nova Scotia. (W. V. Guise) The Vegetable Caterpillar from New Zealand. An Entomological Dream. (The Editor) Systema Naturæ. On Birds using Oil from Glands. Miscellaneous Notices.—Curious Freak of a Dog. Long-eared Owl. The Raven. Indications of Spring. White-tailed Eagle. Rare Birds. Rare Birds about Plymouth. Jack Snipe. Skenea rota. British Butterflies. Review.—The Natural History Review. The Querist.—Vegetable Caterpillar, &c.

No. 76, June. (F. M. Burton) On the Classification of the Animal Kingdom. No. 3. (O. S. Round) Birds' Nests. On Unity of System. Entomological Dream. (Major Wedderburn) Addenda to the Birds of Novia Scotia. (The Editor) Systema Naturæ. Miscellaneous Notices.—Natural History Review, (A. H. Haliday) Setting of Hymenoptera.

No. 77, July.—(T. Fuller) Sympathy between Man and Animals. (O. S. Round) On Birds' Nests. (G. R. Twinn) What are they for? On Unity of System. (W.) Fish notes. Unexpected arrivals. (Edward J. Maude) First appearance of Migratory Birds in the neighbourhood of Kilnsey, in Craven, Yorkshire. (J. M'Intosh) The Misteltoe. (O. S. Round) Migration. (The Editor) Systema Naturæ. MISCELLANEOUS NOTICES.—Blackbirds. The Cuckoo. Carabus intricatus. Rara avis. PROCEEDINGS OF SOCIETIES.—Thirsk Natural History Society. (The Querist) On Birds using Oil from Glands. Synapta lineata. Singing of Birds.

No. 78, August.—(G. R. Twinn) Beautiful Harmony. Instinctive action of a Blind Horse. (Robert Gray) Remarks upon the Ringed Guillemot; with engravings. (O. S. Round) Birds' Nests. (F. M. Burton) On the Classification of the Animal Kingdom. (The Editor) Systema Naturæ. MISCELLANEOUS NOTICES.—The Corn-crake. Singing Birds near large towns. "April showers bring Spring Flowers." Sphinx Euphorbiæ at Box Hill. REVIEWS.—The Natural History Review. Index Filicum. The British Botanist's Field Book. THE QUERIST.—The Mistletoe.

No. 79, September.—(O. S. Round) Characteristics of Common Birds. (G. R. Twinn) A Memory from Stratford-on-Avon. (W. V. Guise, F. L. S.) On the Cotteswolds. (Charles Edward Smith) Occurrence of Rare Birds at Ackworth. On Unity of System. (O. S. Round) Sunday in the Country. (G. R. Twinn) Butterflies. (George Wightwick) The Tree of Thibet. (The Editor) Systema Naturæ. (F. M. Burton) On the Classification of the Animal

Kingdom. MISCELLANEOUS NOTICES.—Ornithology in the House of Commons. Resuscitation of Plants. Turtle Doves. Eristalis nubilipennis in Ireland. Liparis monacha in Lincolnshire. Purple Emperor in Lincolnshire. Swallow roosting in a hedge. Erebia blandina, &c. THE QUERIST.—The Ringed Guillemot.

TRANSACTIONS OF THE ENTOMOLOGICAL SOCIETY OF LONDON. New series. 8vo. London. Vol. IV. Part IV.; with One Plate. 1857. Price 2s. Vol. IV. Part V.; with Three Plates. September, 1857. Price 3s.

(Wollaston, T. V.) Revision of the British Atomariæ; concluded—p. 81. (Stainton, H. T.) On the recent progress of Micro-lepidopterology on the continent—p. 82-86. (Baly, J. S.) Description of two insects belonging to Pseudomela, a new genus of Chrysomelidæ—p. 87, 88. (Pascoe, F. P.) On new Genera and Species of Longicorn Coleoptera; Part II.—p. 89-112. PROCEEDINGS from Nov. 3, 1856, to Feb. 2, 1857; Anniversary Address of the President—p. 33-56. (Stainton, H. T.) Observations on Genera—p. 113-115. The Binomial system of nomenclature, through its nearly unanimous adoption by naturalists, since Linnæus, has tended to give a factitious importance to the genus, as distinguished from other groups of greater or less contents. This influence may be clearly traced in many of the speculations which have appeared from time to time, touching the limits and number of genera, their existence in nature, &c. We might illustrate this by the notion, very generally entertained, that the common use of the decimal notation implies some peculiar intrinsic fitness of the number 10 to be the basis of arithmetical operations. The real office of the generic name as a help to memory being allowed to fall out of sight, it is no wonder if genera have been often constituted and judged on grounds irreconcileable with that object. How long, in the accelerated progress of the discovery and discrimination of species, it may suffice to employ a single step to clear the proportionally widening interval of analytic propositions succeeding one another between the species and the aggregate of organised nature—that is to say, how long the Binomial nomenclature may continue to satisfy the wants of science—is a question that may soon be pressed irresistibly on the consideration of Naturalists. So long, however, as the generic name is acknowledged as the sole complement of the trivial, the relation of the group selected to bear that name to *both* ends of the chain will require to be considered. If we rightly apprehend the gist of this article, the writer's inclination is to designate as genus the natural group next above the species. The limitation, which he allows, in the application of this principle, from the discovery of connecting links, seems to be nullified by the subsequent admission made of the existence of such intermediate species in relation to *all* genera. The adoption of genera containing only single species has such an important bearing on the right conception of the characters and the limits of the genus, that it deserved, we think, some more exact investigation than the question has received here. (Smith, F.) Observations on the difficulties attending the discrimination of the species of the genus *Stylops;* with a plate—p. 115-118. The delicate bodies of the insects of this group are so much deformed in drying, that any but recent specimens afford scanty means for the determination of specific characters. Mr. Smith having, in most instances, been able to collate the figures that have been published of the supposed British species, with the original specimens, has found them, with the exception of those given in Curtis' British Entomology, so unsatisfactory that he doubts whether there is any good evidence of the existence of more than one species of Stylops in Britain. Copies of some of these figures are given in the plate, along with some original sketches. (Walker, F.) Characters of undescribed Diptera in the collection of W. W. Saunders, Esq.—p. 119-158. This paper, which forms the principal bulk of the present part, contains the description of eighty-two new species of various families, from Stratiomydæ to Conopidæ, and from different parts of the globe. Two new genera of Syrphidæ are characterised, *Lycastris* and *Rhoga*. Some bibliographic notices are added, and some analytic tables of genera. The summary which Mr. Walker has given in some instances of the geographical distribution would deserve to be carried out more extensively and more in detail. The materials, in collections, for

such an estimate have been vastly increased of late years; yet the most which they would afford might be a comparative view of the known number of species of a few conspicuous groups within some limited districts in distant parts of the globe. Even for this end, a careful collation and reduction of the nominal species would be almost a necessary preliminary. (Westwood, J. O.) On the oriental species of Butterflies related to the genus *Morpho*—p. 158-160. Only commenced in the present part. The two coloured plates given with this part serve to illustrate Mr. Pascoe's paper on Longicorn beetles.

GERMANY.

VERHANDLUNGEN DES ZOOLOGISCH-BOTANISCHEN VEREINS IN WIEN. TRANSACTIONS OF THE ZOOLOGICAL AND BOTANICAL ASSOCIATION OF VIENNA. 8vo. Vienna. Vol. VI., with Ten Plates. A.D. 1856.

ZOOLOGY.—(Hanf) List of the Birds observed about the Furt-teich, near Mariahof, in Upper Styria, with notices of their Natural History, provincial names, &c.—p. 671-700. (Erber) Observations on the habits of Amphibia in captivity, and on *Zamenis æsculapii* Wagler, in particular—p. 393-396. (Wankel) On the Fauna of the Moravian caves—p. 467-470. (Frauenfeld) Contribution to the Fauna of Dalmatia—p. 431-448. A list of insects, viz., Diptera, Neuroptera, Hemiptera, and Formicidæ, and of land and freshwater Mollusca, collected in this province. The author notes, as peculiarly characteristic, the predominance of the Bombylidæ among Dipterous insects, and of the genus Clausilia among the Gastropod Mollusks. (Schiner) Revision of the Diptera enumerated by Austrian entomologists—p. 399-424. The authorities reviewed in the present part of the essay are Poda, Insecta Musei Græcensis, Græcii, A.D. 1761, and Scopoli Entomologia Carniolica. The only result of the examination of the former of these sufficiently interesting to be cited here is the observation that Schranck, while he cites *Tipula maxima* Poda correctly, has without apparent reason altered the trivial name to *gigantea*, under which the species is to be found in most recent works. The examination of the work of Scopoli leads to conclusions of more moment for the right nomenclature of the Diptera, according to the laws of scientific priority. Schiner remarks with good cause on the unjust neglect with which a work, not inferior to most of its contemporaries for clear and concise descriptions, has been generally treated until of late, and endeavours to prepare the way for a more general restitution by referring the later synonyms to the earlier names of Scopoli, where this can be done with certainty. In the course of this discussion, he has been led into some critical remarks on the doubtful application commonly made of some Linnean names. (Same) Additions to the list of Austrian Asilidæ in Vol. V.—p. 167-174. (Same) Observations on Frauenfeld's essay on Galls produced by insects, in the fifth volume of these Transactions—p. 215-224. With descriptions of a new species of *Clunio*, *C. adriaticus*, and another Dipterous insect of the Adriatic coast, for which the author proposes a new genus *Thalassomyia* in the family Chironomidæ. (Loew) On the Dipterous genera Microdon and Chrysotoxum—p. 599-622. From this learned and minute critical inquiry, we derive the following conclusions regarding the names and synonyms of the British species of these genera. MICRODON: 1. *apiformis* Degeer; Meigen; Walker;—*mutabilis* Linn.; Fabr.; Fallen; Meigen; Zetterstedt; Walker;—*apiarius* Fabr.; Latreille;—*auropubescens* Latreille;—*scutellatus* Schummel;—probably also *Musca nova* Schranck;—to which we add *Mulio mutabilis* Panzer Fn. G. 82, 21. 2. *devius* Linn.;—*piger* Schranck;—*micans* Meigen;—*anthinus* Meigen;—*apiformis* Curtis; Zetterstedt;—*fuscitarsis* Schummel;—to which may be added *Stratiomys conica* Panzer Fn. G. 12, 21. CHRYSOTOXUM: 1. *sylvarum* Meigen; Schummel;—*fasciolatum* Meigen; Rondani;—*scutellatum* Macquart?—*arcuatum* Walker. 2. *fasciolatum* Degeer; Fallen;—*vespiforme* Fabr.;—*marginatum* Meigen; Schummel; Zetterstedt; Walker;—*costale* Meigen. 3. *festivum* Linn.; Scopoli; Walker;—*arcuatum* Fabr.; Fallen; Meigen; Macquart; Zetterstedt. 4. *octomaculatum* Curtis; Walker;—*intermedium* Zetterstedt;—*chrysopolita* Rondani. 5. *elegans* Loew; Zetterstedt;—*arcuatum* Dumeril;—*intermedium* Walker, 6. *bicinctum* Linn. &c. (Keferstein) On Oestrus hominis—p. 637-

652. Concluding against the existence of a species appropriated to man, while admitting the evdence that Oestrus bovis, Cuterebra noxialis, &c., do occasionally deposit their eggs on the human body, and that these are developed there. (Kolenati) *Nycteribia frauenfeldii* n. sp.; with figures—p. 188, 189. The largest European species of the genus; found, but very rarely, in the fur of Vespertilio murinus hybernating in the caverns of Moravia. (Egger) New genera and species of Diptera of the families Tachinariæ and Dexiariæ; with other remarks on insects of this order—p. 383-392. (Hornig) The metamorphosis of some Lepidoptera, *Cidaria cæsiata* Wien. Verz., and *Grapholitha conterminana* H. Schaeffer—p. 21-24. (Schedl) Metamorphosis of *Eupithecia mayeri* Mann —p. 163. (Schleicher) List of the Lepidoptera of the Circle above the Wienerwald—p. 653-670. (Mayr) Additions to the list of Hungarian Formicidæ—p. 177, 178. (Giraud) On some rare or little known species of Hymenoptera occurring about Vienna—p. 179-188. Among these, a second species of the genus *Elasmus*, *E. westwoodii*, reared from some small soft galls of the Aspen. (Hampe) On a new subterranean beetle—p. 463. This insect, *Pholeuon angusticolle*, figured, constitutes a new genus of Silphidæ, allied to Leptoderus, but distinguished by the presence of a scutellum, the keeled sternum, the subulate maxillary palpi, &c.; found in a cave in Hungary at an elevation of 4,500 feet above the level of the sea. (Miller) *Oryotus schmidtii*—p. 627. (Same) *Drimeotus kovacsii*—p. 635. These two new genera of subterranean Coleoptera, here figured, the former from a cave in Carniola, the latter in Hungary, form with *Pholeuon* connecting links between Leptoderus and Adelops. The foretarsi are four-jointed in the female Drimeotus, and in both sexes of the two other genera, and the first two joints dilated in the male Oryotus. (Kraatz) *Typhlobium*, a new subterranean genus of Staphylinidæ—p. 625. The species *T. stagophilum*, figured, was found in one of the Carniolan caves by that indefatigable investigator, Ferdinand J. Schmidt, but has also occurred under the bark of a tree. It is allied to Lathrobium, but distinguished by the want of eyes, not total however, as in the place of those organs there is a minute spot distinguished by its lighter colour, which the author compares to a spiracle. (Brauer) List of the Odonata and Perlidæ found in the Austrian empire—p. 228-234. (Same) Comparative description of *Sialis fuliginosa* Pictet? and Burmeister, and *S. lutaria* L.—p. 397, 398. (Same) Revision of the Austrian species of *Chrysopa*, and description of a new species, *C. tricolor*; with a plate—p. 703-708. (Kolenati) A new Austrian Phryganea, *Stenophylax areatus*; with a plate—p. 165, 166. (Heller) Contribution to the Fauna of the Adriatic; with a plate—p. 629-636, 717-720. *Pontonella* new genus of Alphæidæ; *Stenorrhynchus inermis* n. sp. (Gredler) The land and freshwater shells of Tyrol; with a plate—p. 25-162. Four new species of *Pupa* are figured and described; *P. claustralis*, *striata*, *genesii*, *leontina*. (Hauffen) Two new subterranean Gastropoda, *Valvata erythropomatia* and *Paludina pellucida*; figured—p. 465, 466. (Same) *Carychium reticulatum* n. sp.; figured—p. 623. (Same) Two new subterranean Gastropoda, *Carychium bidentatum* and *Valvata spelaea*; figured—p. 701, 702. BOTANY.—(Pluskal) History of Botany in Moravia—p. 363-372. (Fritsch) Instructions for the observation of the phenomena of vegetation on the banks of the Danube—p. 709-716. (Kerner) The Bakony forest; a sketch of Botanical Geography—p. 373-382. (Pernhoffer) Essay towards a sketch of the Botanical Geography of the country about Wildbad Gastein—p. 3-20. (Sapetza) Contribution to the Flora of Moravia and Silesia—p. 471-474. (Pancic) List of Phanerogamous plants that grow spontaneously in Servia; with characters of some new species—p. 475-598. The *new species* are Trifolium trichopterum, Geranium fasciculatum, Lavatera muricata, Eryngium serbicum, Koeleria eriostachya. (Mayr) Excursion to Szegedin in the Autumn of 1855—p. 175-177. (Reissek) On the wild growth of the vine in the basin of Vienna—p. 425-430. (Schur) The Sesleriaceæ of the Siebenbuergen—p. 191-214. (Fenzl) *Sedum hillebrandii* n. sp., with remarks on the distinctions of some species of the group of S. acre—p. 449-462. (Perger) On Atropa mandragora—p. 721-724. (Heufler) Contributions to

the Lichenology of the district of Vienna—p. 225-228. (Same) The European species of Asplenium; with three plates and a chart of geographical distribution —p. 235-354. (Poetsch) Contribution to the Bryology of Lower Austria—p. 355-362.

PROCEEDINGS.—(Muehlig) Observations on the habits of Falco milvus in captivity—p. 22-24. (Aschner) Albinism in a swallow the effect of internal injury—p. 75. (Hanf) Migration of birds in 1856—p. 91. (Lindenmayr) On the habits of Sylvia elaica—p. 92. (Kner) On Artificial Impregnation—p. 43-45. (Mahler) Dytiscus marginalis infested by Gordii—p. 11. (Same) Discovery of a *Troglorrhynchus* in the Magdalena grotto—p. 11. (Leinweber) Galleruca xanthomelaena injurious to the elm—p. 74. (Gredler) Helicidæ of Styria—p. 73. (Frauenfeld) Observations on two species of Carychium, described as new by Hauffen—p. 94. (Same) On Aquaria—p. 70-73. (Sauter) Corrections of the list of plants of the Lungau Alps by Hillebrandt, in vol. 3 of these Transactions—p. 10. (Pokorny) Notice of the "Physiotypia plantarum Austriacarum"—p. 54, 56, 59. (Holzinger) Pulmonaria mollis, an addition to the Flora of Lower Austria—p. 62-64. (Bermann) *Geum sudeticum* Tauscher found in Upper Styria—p. 64. (Niessl) On intermediate forms between *Melampyrum nemorosum* and *sylvaticum*—p. 82-85. (Same) Examination of the Pollen of the different forms—p. 106. (Reichardt) Additions to the Flora of Iglau—p. 86. (Bilimek) Occurrence of *Betula oycowiensis* Besser in the Austrian territory—p. 88. (Andorfer) Botanical excursion to Hohenau—p. 93. (Reichardt) Contribution to the Flora of Austrian Silesia—p. 104. (Heufler) Notice of Facchini's manuscript work, the Flora of Cisalpine Tyrol—p. 15. Facchini's Observations on the genus Hieracium—p. 17. (Pokorny) On a Ceratophora in the caves of Karst, produced from a Lenzites—p. 9. (Frauenfeld) Notice of his work the Algæ of Dalmatia—p. 89-91. (Heufler) Rare Cryptogama of the Lower Mürzthal—p. 106. (Same) On the study of the Cryptogama—p. 46-49. (Same) On the views of Linnæus with regard to the Sexual and the Natural Systems in Botany—p. 49-51. (Same) Notice of the Reading book for the Intermediate schools of the Austrian empire—p. 88. Discussion, in the Botanical section of the Meeting of German Naturalists at Vienna, in 1856, on the best method for Observations on the phenomena of Vegetation—p. 97-100.

ZEITSCHRIFT FUER DIE GESAMMTEN NATURWISSENSCHAFTEN, U. S. W. redigirt von C. Giebel and W. Heintz. JOURNAL OF THE NATURAL SCIENCES IN GENERAL, published by the NATURAL HISTORY ASSOCIATION OF SAXONY AND THURINGIA. 8vo. Berlin.

Vol. IX.; with 12 Plates; January to June, 1856.

ORIGINAL ESSAYS.—(Giebel) Osteological characters of the skull of the Ourang-utan; with reference to Burmeister's observations in D'Alton and Burmeister's Journal of Zoology, &c., A. D. 1848—p. 443-447. (Same) Osteology of *Procyon* —p. 349-373. Concluding that there is as yet no satisfactory evidence of the existence of more than one species of Racoon in North America, the osteological characters not supporting the specific distinction of *P. brachyurus* and *obscurus* Wiegmann. (Hellman and Kalb) On the successful eradication of the Hamster round Gotha—p. 170. (Brendel) Birds of the Peoria district in the state of Illinois—p. 420-425. (Nitzsch) Posthumous notes on the Anatomy of Cathartes aura, Falco albicilla, lagopus, and buteo—p. 426-433. (Same) Posthumous notes on the Sclerotic ring, the pecten, and Harder's gland in the eye of birds; with six plates—p. 383-419. (Same) Characters of *Philopterus*, a genus of Mallophaga; posthumous essay—p. 249-262. (Same) Helminthological researches; posthumous essay—p. 264-269. (Kochler) Microscopical and chemical examination of the concretions, corpuscula oryzoidea, in the sheaths of the tendons; with a plate —p. 269-276. (Heintz) On the composition of the solid part of Olive oil—p. 434-438. (Gerlach) Analysis of Triphylline—p. 148-152. (Elis) Geological rambles through the Huy, near Halberstadt—p. 447-452. (Weichsel) Ancient mines and smelting works on the northern boundary of the Harz—p. 459-462.

(Oberbeck) On the stratification and false cleavage of the slate of Wissenbach; with three plates—p. 22-60. (Giebel) *Dichelodus*, a new genus of fish, in the copper schist of Mansfeld; with a plate—p. 121-127. (Same) Fossil Fauna of the Lithographic slate of Solenhofen; with two plates—p. 378-388. Two species of Libellulidæ, *Aeschna multicellulosa*, and *Calopteryx lithographica; Buria rugosa*, a Crustacean intermediate in its characters between Idotea and Tanais; and two Holothuriæ, *Protholothuria annulata* and *armata*. (Same) The fossil species of the genus *Capulus*—p. 162-169. (Same) On Bornemann's discovery of the Cretacean formation in Thuringia—p. 455. (Same) On the earthquake of the 1st of June, 1857, in Saxony and Thuringia—p. 438-443. (Chop) Teeth and remains of fishes in the Keuper of Schlotheim; additional notices, with a plate—p. 127-132. (Stichler) Fossil flora of the Quader sandstone of Langenberg, near Zwedlinburg—p. 452-455. (Purgold) Crystals and their origin—p. 277-299. (Soechting) Paragenesis of white-lead, and of the Hydrocarbonate of copper—p. 168. (Gross) On the arrangement of a Geological museum—p. 153-162. Extracts from the Proceedings of the Royal Swedish Academy, &c. (Meves) Fauna of Gothland—p. 459. (Wahlberg) Bombi of the North—p. 132-136. (Thomson) Swedish species of Omalium—p. 458. (Bohemann) Sexual union between different species of insects—p. 300. (Zetterstedt) Botany of the Pyrenees—p. 300-302. (Nillson) Ethnographical inferences from the antiquities exhumed in Scandinavia—p. 60-65.

Literary Notices. Zoology, eighty-nine. Botany, twenty-eight. Geology, Mineralogy, and Paleontology, one hundred distinct articles.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften. Proceedings of the Vienna Imperial Academy of Science. Math. Nat. History Class. 8vo. Vienna.

Vol. XXII. Three Parts; with Twenty-three Plates. 1856.

(Jendrassik) Anatomical examination of the structure of the Glans Thymus; with a plate—p. 75-113. (Voigt) On a newly discovered system of lines on the surface of the human body, and on the principal regions of ramification of the nerves of the skin, and the mode of distribution of the nerves in these—p. 240-248. (Engel) On the arrangement and development of feathers; with five plates—p. 376-393. The arrangement of the feathers is connected with the progress of segmentation in the embryo, which precedes the development of the several parts, each of the divisions formed on the surface of the body by these processes becoming clothed with feathers independently of the others. In each division the development of the capsules proceeds from the circumference towards the centre, the arrangement of them following the outline more closely in proportion as they approach to this boundary. The formation of a series of capsules commences with the appearance of a thickened streak, which afterwards breaks up into divisions corresponding to the number of feathers. In each pair of contiguous streaks the roots are developed alternately, so that each capsule in one series is opposed to the space between two in the next, giving rise to a great variety of complicated geometrical figures. The feather appears, in the first instance, as a nearly rounded collection of cells, which becomes divided subsequently into two spherical masses. The superficial cells coalesce with one another both longitudinally and transversely, so that the feather acquires a fibrous structure. The growth of the feather takes place from the end by the development of a terminal bud which forms a new one by transverse fission, and so on, till the end of the feather has attained a certain degree of slenderness. Similar terminal buds then appear on the separate vanes of each feather, and these, by continued transverse fission, develope new terminal and lateral buds, which last constitute the bilateral fringe of the individual vanes. In the course of these processes there is no formation or repartition of cells in the ordinary sense of the term. (Frauenfeld) On the genera *Raymondia* Fr., *Strebla* Wdm. and *Brachytarsina* Mcq.—p. 468-478. A critique of Kolenati, who in his "Parasites of the Chiroptera" has referred the genus Raymondia, proposed by Frauenfeld in the eighteenth volume of these Proceedings, to Strebla Wdm., as Walker had previously done, in the Catalogue of

the Diptera of the British Museum, with a species of the same group, Strebla africana. The distinctions seem abundantly sufficient in these instances to forbid such a reunion; but it is not so clear that Raymondia is not identical with Brachytarsina Mcq., as Loew thinks, notwithstanding the discrepancies in the figure and description given by Macquart, Dipteres Exotiques Supplement IV., which Frauenfeld has here drawn attention to. A new species, *R. diversa*, characterized from a single specimen, is remarkable for an irregularity of the venation, which, although symmetrical in both wings, is probably a monstrosity. (Same) Contributions to the Natural History of Trypeta, with descriptions of some new species; with a plate—p. 523-557. Fifty-nine species are enumerated as inhabiting plants of the order Compositæ, while only nine are known as attached to plants of other orders. The new species described are *T. affinis*, *amœna*, *eggeri*, *intermedia*, *mamulæ*, *maura*, *schæfferi*, European; and two from Egypt and Arabia, *T. conyzæ* and *augur*. (Loew, F.) Description of the larva of *Nebria picicornis*, and general characters of the larvæ of this genus; with a plate—p. 298-306. (Frauenfeld) On the Paludinæ of the group *P. viridis* Poir.; with a plate—p. 569-578. (Unger) On the ducts which contain the milky juice in Alisma plantago—p. 169. (Ettinghausen) On the venation of the leaves in the Celastrineæ—p. 269-271. (Perger) The German names of native plants; the orders Ranunculaceæ, Papaveraceæ, Cruciferæ, and Solaneæ—p. 559. The three preceding essays will appear in full in the Transactions. (Wertheim) On a new alkaloid in *Conium maculatum*—p. 113-121. (Steer) On the preparation of Gallic acid—p. 249. (Bohm) Studies of Chlorophyll—p. 479-512. (Rochleder) Note on the Tannin of galls—p. 558. (Pohl) Heliotypy an instrument for the study of the Venation in the leaves and blossoms of plants, and for the detection of Adulteration in certain drugs and groceries—p. 291-297. (Schmidt) The Baradla cave near Agtelek, and the Ice cave of Lednica near Szilitz, in Hungary—p. 579-621. (Boué) On the Geological maps of Europe, and on Geological maps in general—p. 561-568. (Lorenz) On the origin of the Coal bed of Hausruck; with two plates—p. 660-672. (Boué) On Ptschelar's Hydrographic map of the Circle of Kraina in Servia; Belgrade, 1856—p. 673-691. (Unger) On the fossil plants of the fluviatile Limestone and Quartz; and Studies of the Leitha limestone, its vegetable contents and mode of formation;—Extracts from two essays to be inserted in the Transactions—p. 697-700. (Reuss) Fragments concerning the genesis of Minerals—p. 129-210. (Haidinger) Kenngottite, a mineral species from Felsobanya in Hungary—p. 236-239. (Bauer) Analysis of Kaolin from Zettlitz in Bohemia—p. 693-696. (Pohl) Analysis of Bittern from the Saltern of Piran—p. 122-128. (Hauer) Analysis of the mineral water of Stubitza in Croatia—p. 307-316. (Partsch) On the Black stone of the Kaaba in Mecca—p. 393.

ABHANDLUNGEN DER NATURFORSCHENDEN GESELLSCHAFT ZU HALLE. TRANSACTIONS OF THE SOCIETY OF NATURALISTS OF HALLE. 4to. Halle.

Vol. IV. Part I.

(Gegenbaur) On the development of Sagitta; with a plate—p. 1-18. The observations were made on *S. bipunctata*, and a smaller species, out of three distinct species which occur about Messina. The substance of them has been already given in Siebold and Kœlliker's journal of Scientific Zoology, Vol. V. They are so completely at variance with Darwin's observations on the supposed spawn of Sagitta, that the author concludes that this was in reality the spawn of some fish. The most noticeable points are as follows:—The division of the yolk produces long pyramidal cells having their base at the surface and the apex towards the centre, which retain this form even after the formation of the embryo has commenced. The origin of the intestinal canal is contemporaneous with the division of the yolk; and it appears at first as a central cavity of the yolk, the communication with the exterior being established at a later period. The development from the egg is completed without any metamorphosis, not even cilia being produced on the surface of the embryo. Hence the type of development appears to be totally different from that of Mollusca, the embryo being formed

without metamorphose, without a velum, or even the temporary presence of cilia. This last circumstance distinguishes it from the Annelides and Platodes, but points to the analogy with the Nematodes, with which also the mode of development agrees best throughout, except as regards the singular form of the segmentation cells, and the first formation of the intestinal cavity. These peculiarities tend to confirm the views of the first observer, Slabber, who placed Sagitta among the worms, but as a peculiar group—Dart-worms, which Gegenbaur would intercalate between the Nematodes and Annelides. (Schultze) On the land Planariæ, from the observations of F. Mueller in Brazil, and original investigations—p. 18-38. Among the species observed by Mueller in Brazil, one is colourless and destitute of eyes, its mode of life being subterranean, and its food *Lumbricus corethrurus*. The terrestrial kinds as well as the aquatic appear to have a coat of cilia. Schultze's anatomical and histological observations were made on a specimen belonging to a new species—*Geoplana burmeisteri*, brought home, preserved in spirits, by Burmeister. He recommends for the preservation of such delicate objects a solution of bichromate of potash, in the proportion of one to two grains in an ounce of water, as preferable to spirits of wine. (Herter) Sketch of the Lignite formation of Thuringia and Saxony; with a map—p. 39-85. Within this district two distinct formations occur, one, which predominates, of marine deposition; the other, confined to a small tract on the western declivity of the high ridge of the Rothliegendes which separated it from that ancient sea, is characterized by the great regularity of deposition in small limited basins, the perfect stratification and the mineralogical character of the rocks, plastic clays prevailing in the absence of coarse arenaceous deposits. In this continental formation the beds of coal consist of well preserved pieces of stems. The characteristic absence of fossils in the Lignite excludes direct evidence of the Geological antiquity of these formations. The relative position evinces the Lignite to be older than the Tongrian system, as it underlies a member parallel with this. The marine formation at Bornstedt is unequivocally superincumbent over the continental, so that the latter, in this locality at least, may be referred to the most ancient of the Tertiary formations of Germany. The dislocations of the rocks within the district investigated afford evidence of violent convulsions that have occurred since the Lignite was deposited.

Proceedings for 1856. (Volkmann) Regularity of action of the muscles—p. 3. (Vogel) Change of the matter of the human body—p. 5. (Schultze) Structure of the olfactory organ—p. 7. (Burmeister) *Anomalura pelei* allied to Hystrix—p. 5. *Dolichotis patagonica* allied to Cavia—p. 7. On *Ciconia mycteria* and the Storks in general—p. 10. On the Treefrogs of Brazil—p. 8. (Schlechtendahl) On the genus *Datura*, the date of the introduction into Europe of *D. stramonium*, and the specific distinction of *D. tatula*. On the most ancient notices of the Flora of Halle—p. 17-20. On *Placodium yussufii*, the locomotive lichen of the Sahara—p. 21. On the spontaneous growth of *Hydrilla verticillata* and *Najas flexilis* in Pomerania—p. 21, 22. (Andræ) On conical and spherical concretions in the Tertiary sand of the Heath of Nietleben—p. 12. (Girard) On Volger's theory of the origin of Earthquakes—p. 13. On a model of the Carboniferous formation constructed by Professor Gœppert in the Royal Botanical Garden at Breslau—p. 16.

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